



SystemStak™ Valves

ISO 4401 Size 03

Build a Compact, Cost-Effective, Reliable Hydraulic System with Eaton SystemStak™ Valves

Reduces System Space Requirements

SystemStak valves make compact hydraulic systems in which specific function valves are “sandwich” mounted between a directional valve and a standard mounting surface.

Reduce Cost

SystemStak valves eliminate intervalve piping and leak-prone tube and pipe connections. Installed cost is less than when using conventional valves.

Versatile and Easy to Install

SystemStak valves have all the internal passages necessary to serve the directional valve topping them. Mounting surfaces and port patterns are to international standards: any valve conforming to ISO 4401 size 03; ANSI/B93.7M size D03; NFPA-D03; CETOP 3; and DIN 24340, NG6 mounting interface can be used with these SystemStak valves.

Rugged and Reliable

Internal working parts are produced from hardened steel and mounted in ductile (spheroidal graphite) iron bodies. Excellent reliability is ensured. Working parts are accessible without removing valves from an assembled stack.

SystemStak Systems... Easy to Understand, Easy to Design

SystemStak circuitry is best shown using slightly different symbols than those for traditional valve configurations. Each SystemStak symbol has the same basic form and size as shown in fig. 1.

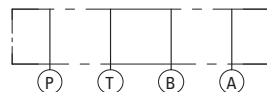


Figure 1

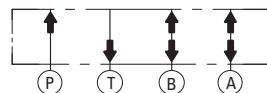


Figure 2

For ease of understanding, remember the directions of flow for each line, and that all four flow paths pass through each valve (see fig. 2). For clarity, directional

valves are drawn vertically in SystemStak circuit diagrams (see fig. 3).

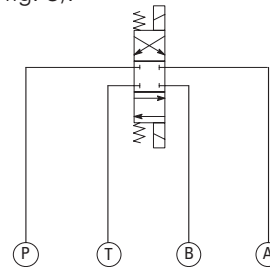


Figure 3

Each station (valve stack) is a combination of functions. When designing and assembling SystemStak valves, care must be taken to ensure that they interact as required by stacking the functions in the correct sequence (fig. 4 is an example).

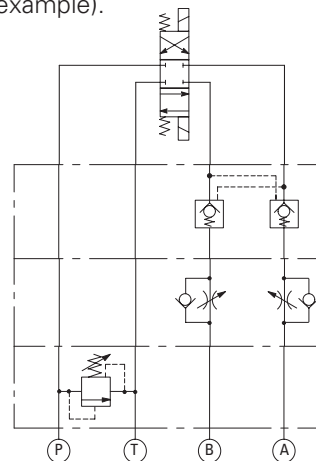


Figure 4

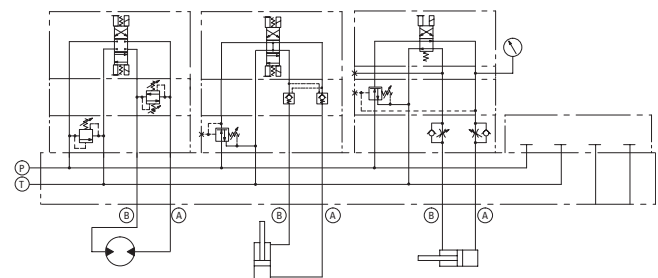


Figure 7

Fig. 7 represents a complete SystemStak system, showing typical use of functions available from this range. The circuit diagram also shows the use of a

Relief valves should normally be positioned next to the mounting surface (i.e. at the bottom of the stack). When both a flow control and a pilot operated check valve are required, it is recommended that the flow control valve be between the check valve and the actuator to prevent check valve chatter.

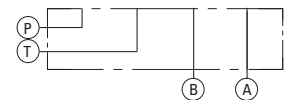


Figure 5

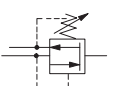
A combination of directional valve, SystemStak valve(s) and subplate/manifold block (fig. 5: single station subplate and fig. 6: multi-station manifold) completes the assembly.



Figure 6

tapping plate for accessing line pressure readings, and a blanking plate to close off an unused station of a multi-station manifold.

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Direct check		DGMDC	Single check in any port; dual check in ports A and B only	11
Pilot operated check		DGMPC	Single in port A or B; dual in ports A and B	14
Flow restrictor		DGMFN	Single or dual port, meter-in or meter-out	17
Further information: Mounting bolts, subplates and manifold blocks Hydraulic fluids Filtration requirements Temperature limits Pressure drop at other viscosities Types H and K adjusters Warranty and repair Ordering procedure				20

SystemStak™ Relief Valves

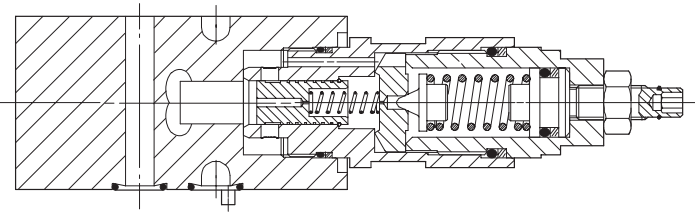
DGMC-3-41
DGMC2-3-41

General Description

These two-stage adjustable pressure relief valves limit the maximum pressure in the line(s) controlled by the integral relief valve elements.

Pressure adjustment options of control knob (with or without keylock) or screw/locknut design are available. The two-stage operation is basically identical to long-established balanced piston valves, described in detail in Eaton Industrial hydraulics manual.

Typical Section



Model Codes

DGMC(2) -3- ** - ** (-B* - **)- * - 41

1 2 3 4 5 6 7 8 9

1 Type

2 – Dual relief function
Omit for single relief function

2

First function

Single relief, or first line of dual models

Code	Pressure limited in	Discharge into	Usage
PT	P	T	Single only
AB	A	B	Single, or dual with BA
BA	B	A	Single only
AT	A	T	Single, or dual with BT
BT	B	T	Single only

3 Pressure adjustment range, first function

A – 3-50 bar (45-725 psi)
B – 3-100 bar (45-1450 psi)
C – 10-200 bar (145-2900 psi)
G – 50-315 bar (725-4500 psi)

4 Pressure adjustment/locking method, first function

H – Handknob
K – Micrometer with keylock
W – Screw and locknut

5 Second function

Second line of dual models

Pressure Code	limited in	Discharge into	Usage
BA	B	A	Dual with AB
BT	B	T	Dual with AT

Omit for single line models

6 Pressure adjustment range, second function

Options as in 3

7 Pressure adjustment/locking method, second function

Options as in 4

8 Gauge port: option on AT and PT single models only

B – G1/4" 1/4 BSPF
S – SAE 4 (7/16"-20 UNF-2B)
Blank – No gauge

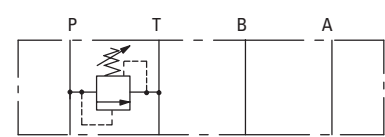
9 Design number, 41 series

Subject to change.
Installation dimensions unchanged for design numbers 40 to 49 inclusive.

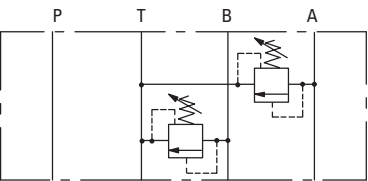
Functional Symbols

For simplicity these two-stage valves are represented as single-stage models

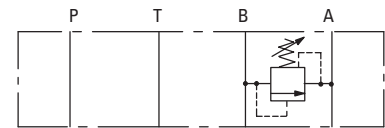
DGMC-3-PT-41



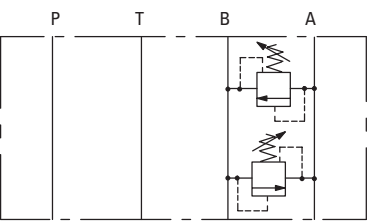
DGMC2-3-AT-**-BT-41



DGMC-3-BA-41



DGMC2-3-AB-**-BA-41

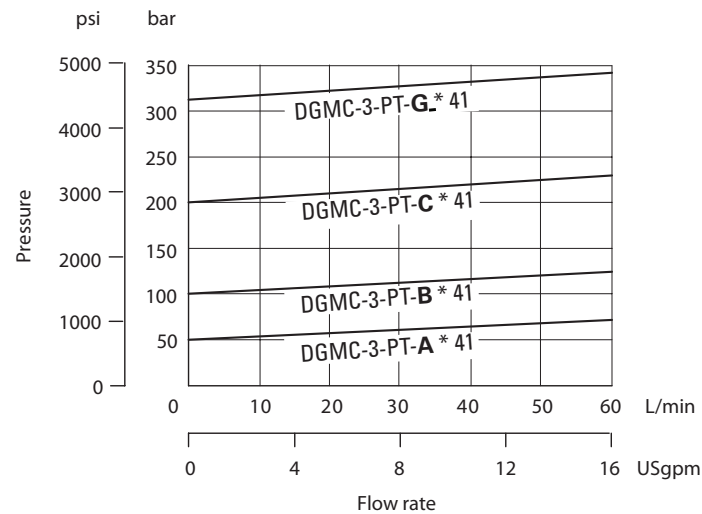


Operating Data

Maximum flow rate	60 L/min (16 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Pressure drops	See graphs
Mounting position	Optional
Mass Approx.	DGMC- 1.3kg (2.9lb) DGMC2- 2.5kg (5.5lb)

Performance Data

Pressure override Typical performance for PT models at max. pressure settings with mineral oil at 21 cSt (102 SUS) and at 50°C (122°F).



Installation Dimensions

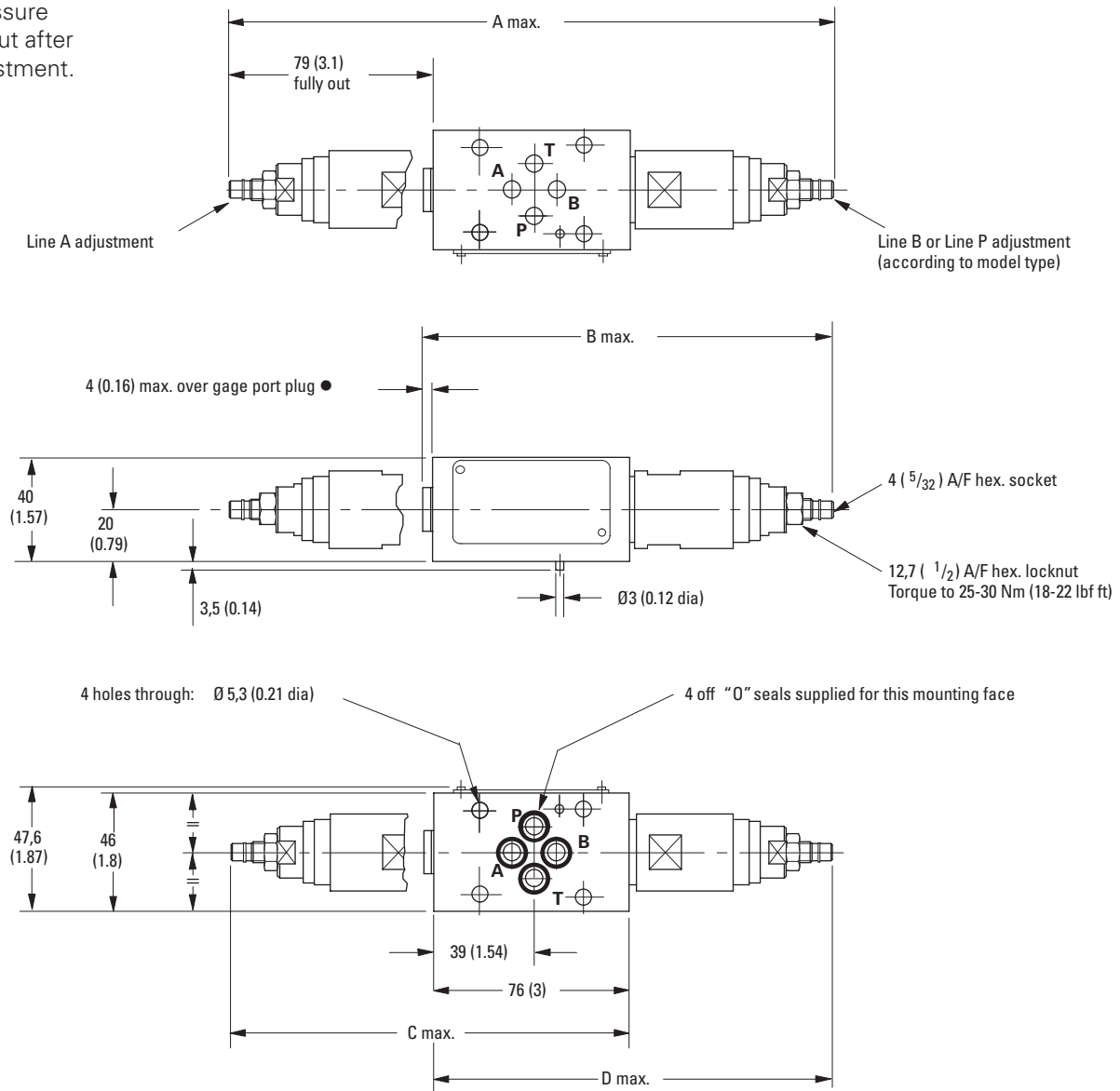
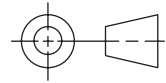
in mm (inches)

DGMC(2)-3**-**(-B**-**-41

Models with type W adjuster

To adjust valve setting
slacken off locknut and turn
adjuster screw. ■

■ Turn clockwise to increase
pressure; counter-clockwise
to decrease pressure
Re-tighten locknut after
completing adjustment.

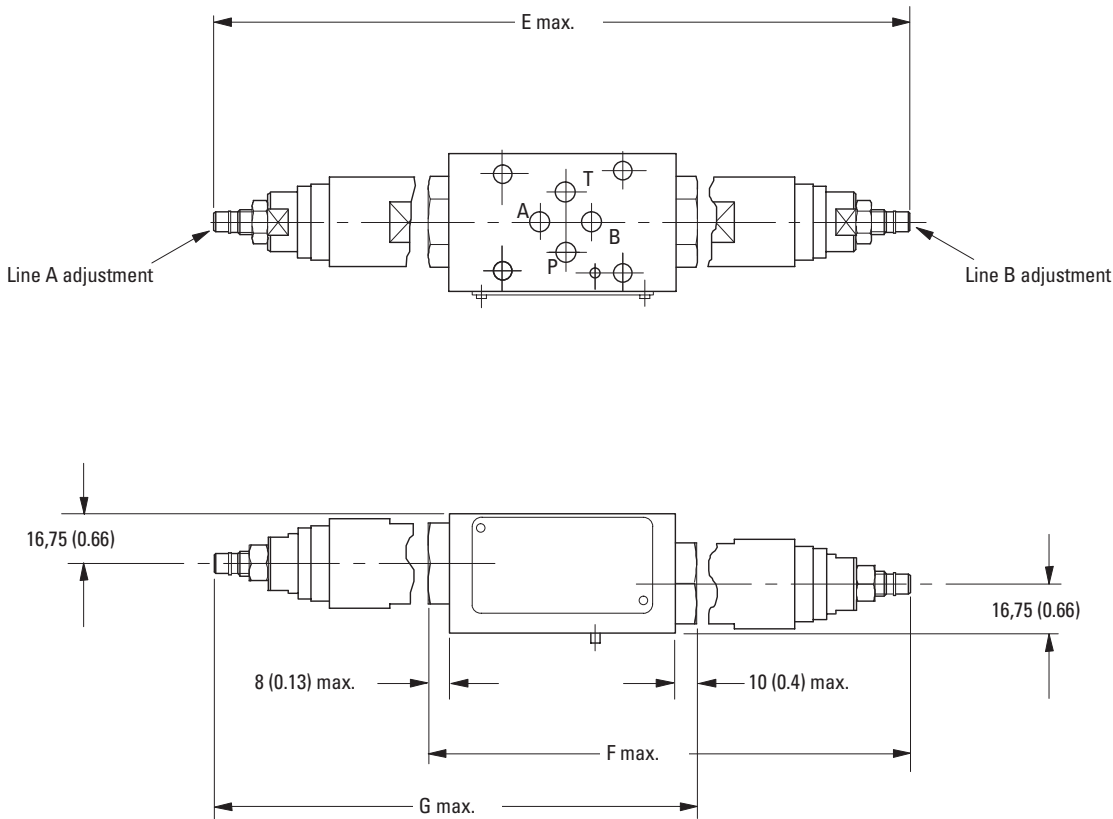


Model	A	B	C	D
DGMC-3-AT-*W-41	—	—	154 (6.1)	—
DGMC-3-BT-*W-41	—	—	—	156 (6.2)
DGMC-3-AT-*W*-41	—	160 (6.3)	—	—
DGMC-3-PT-*W-41	—	—	—	156 (6.2)
DGMC-3-PT-*W*-41	—	160 (6.3)	—	—
DGMC2-3-AT-*W-BT-*W-41	234 (9.2)	—	—	—

● For gage port thread options see model code 8

Installation Dimensions

in mm (inches)



Model	E	F	G
DGMC-3-AB-*W-41	–	–	164 (6.5)
DGMC-3-BA-*W-*41	–	164 (6.5)	–
DGMC2-3-AB-*W-BA-*W-41	234 (9.2)	–	–

SystemStak™

Pressure Controls: Counterbalance, Sequence and Pressure Reducing Valves

DGMR(1)-3-40
DGMX*-3-40

General Description

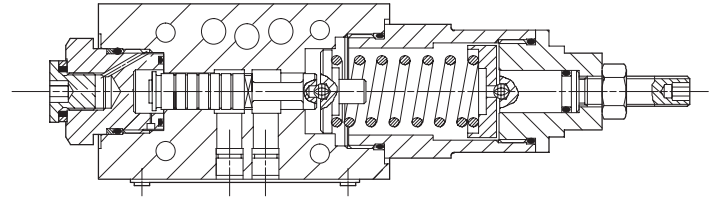
These single-stage valves operate by the application of pressure on the end of the valve spool, acting against a spring which is loaded by means of the adjustment mechanism.

In the counterbalance and sequence valves the spool is offset by the spring such that flow cannot pass through the valve. When the force exerted by the pilot pressure on the spool end exceeds the force of the main spring, the spool is moved to allow flow through the valve.

In the pressure reducing valve the flow path is normally open and is closed as the pilot pressure exceeds the setting of the valve. Excessive pressure in the reduced-pressure line is prevented by a pressure relieving function.

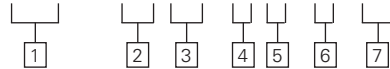
Pressure adjustment options of control knob (with or without keylock) or screw/locknut design are available.

Typical Section



Model Code

DGM *(*) -3- ** (*) - * * - * - 40



1 Type

R – Counterbalance function
R1 – Sequence function
X1 – Pressure reducing, underlapped
X2 – Pressure reducing, overlapped
X3 – Pressure reducing, overlapped, low leakage

pressure in “P” port
For DGMX only:
PA – Pressure reducing function in line P, piloted from A
PB – Pressure reducing function in line P, piloted from B
PP – Pressure reducing function in line P, piloted from P

4 Pressure adjustment range

For DGMX only:
Y – 1,40-7,0 bar (21-101 psi)
R – 1,40-45,0 bar (21-652 psi)
For DGMR and DGMX:
A – 3-30 bar (43.5-435 psi)
B – 3,5-70 bar (51-1000 psi)
C – 10-140 bar (145-2000 psi)
F – 20-250 bar (290-3625 psi)

6 Gauge port

B – G1/8 ” (1/8 BSPF)
S – SAE 4(7/16”-20 UNF-2B)

2 Function ports

For DGMR only:
TA – Counterbalance control function in “T” port, controlled by pressure in “A” port
For DGMR1 only:
PP – Sequence control in “P” port, controlled by

3 Adjuster location

Option on DGMX only
L – Adjuster at “A”-port end of valve
Blank – Adjuster at “B”-port end of valve

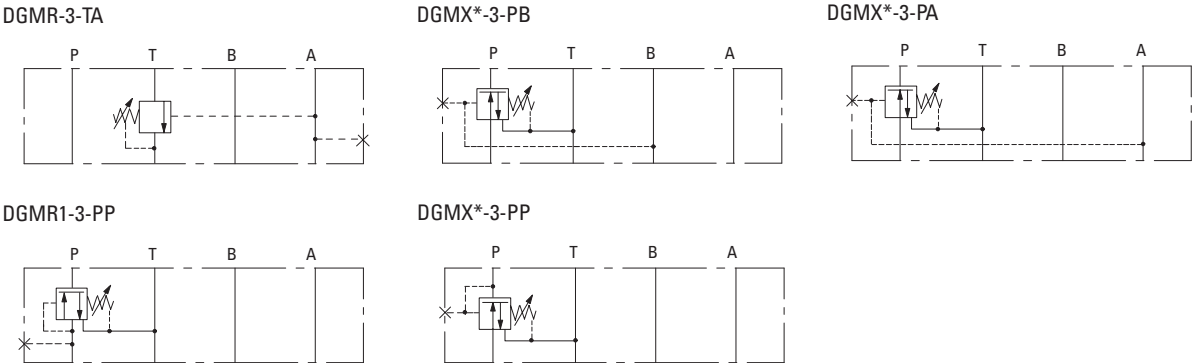
5 Pressure adjustment/locking method

H – Handknob
K – Micrometer with keylock
W – Screw and locknut

7 Design number, 40 series

Subject to change.
Installation dimensions unchanged for design numbers 40 to 49 inclusive.

Functional Symbols



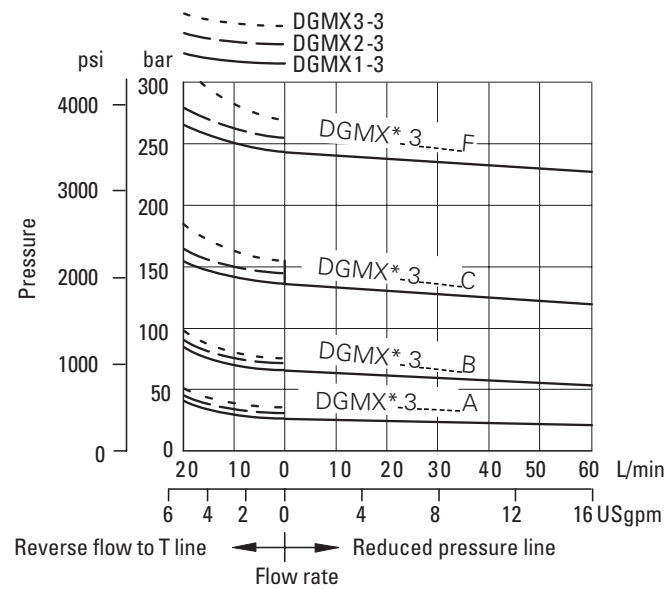
Operating Data

Maximum flow rate	60 L/min (16 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Pressure drops	See graphs
Mounting position	Optional
Mass Approx.	DGMR*- 1.3kg (2.9lb) DGMX*- 1.3kg (2.9lb)

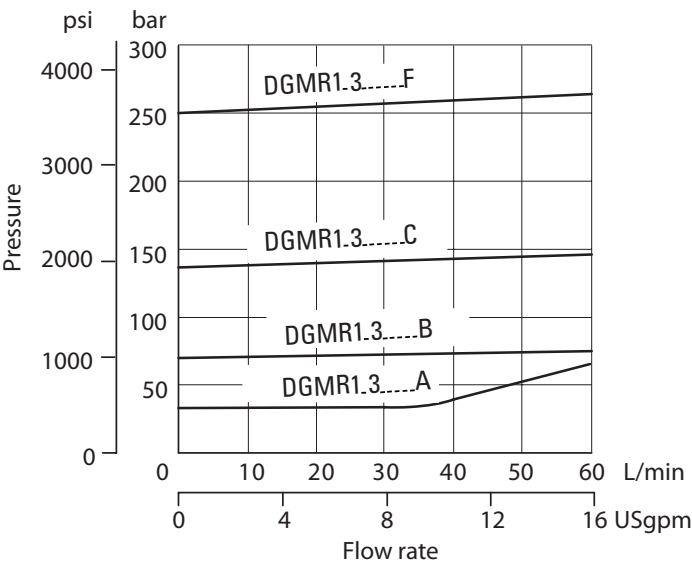
Performance Data

Typical performance with mineral oil at 21 cSt (102 SUS) and at 50°C (122°F).

DGMX*-3-P*



DGMR1-3-PP

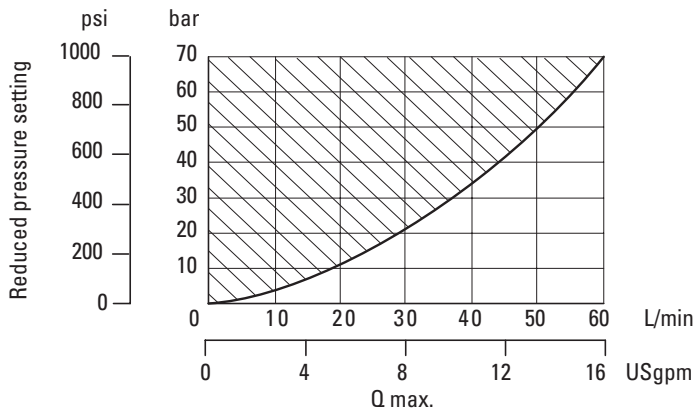


Performance Data

(contd...)

DGMX*-3-P*

Low Pressure/Flow Rate Minimum Performance



Effect of Back-Pressure

The effective reduced pressure is equal to the valve adjustment setting plus any back-pressure in line T

Dead Head Leakage

Typical leakage flow at 250 bar inlet pressure from reduced pressure line into T at "Dead Head" condition (i.e. No flow required at the reduced pressure outlet.)

This leakage flow must be provided at the inlet line P in order to maintain the reduced outlet pressure.

DGMX1-3 = 1600
DGMX2-3 = 400
DGMX3-3 = 80

Installation Dimensions

in mm (inches)

DGMR-3-TA-**-*-40

DGMR1-3-PP-**-*-40

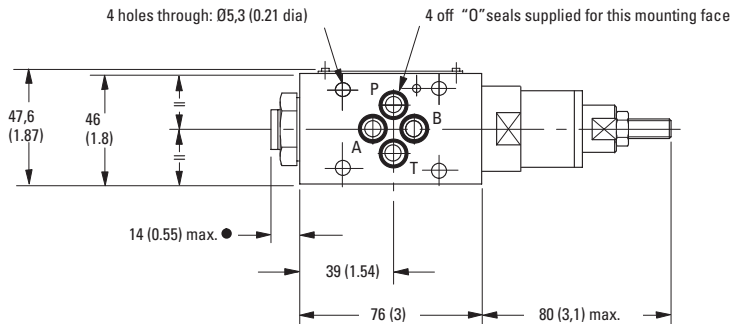
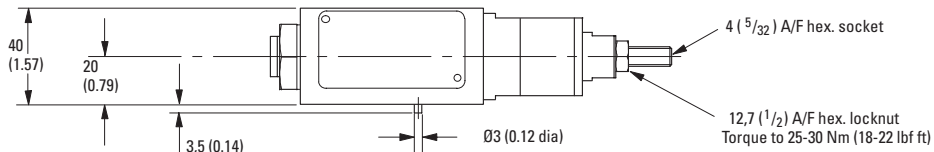
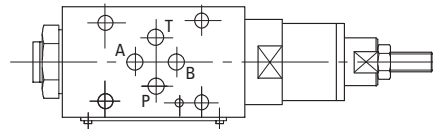
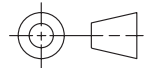
DGMX(*)-3-P*(L)-**-*-40

Models with type W adjuster

To adjust valve setting slacken off locknut and turn adjuster screw. ■

■ Turn clockw to increase pressure; counter-clockwise to decrease pressure.

Re-tighten locknut after completing adjustment. DGMX2-3-**-*L models have adjuster and end cap/gage port locations interchanged from positions shown.



● For gage port thread options see model code 6,
(pressure plug fitted)

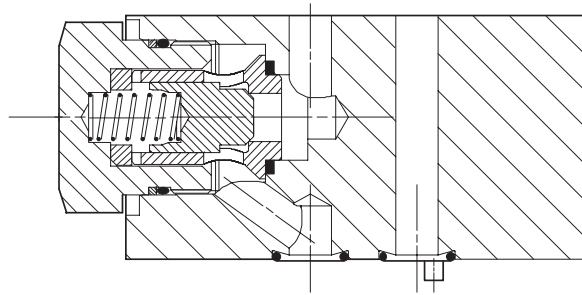
M

DGMDC-3-41

Typical Section

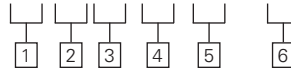
General Description

These valves allow free flow in one direction in the line in which the check valve element(s) is (are) located; flow in the opposite direction is not possible.



Model Code

DGMDC -3- * - * * (-* *) - 41



1 Direction of flow

X – Free flow away from actuator
Y – Free flow towards actuator

2 Check location

A – A line
B – B line
P – P line with free flow towards actuator (X)
T – T line with free flow away from actuator (Y)

3 Check valve opening/ cracking pressure

K – 1 bar (14.5 psi)
M – 2,5 bar (36 psi)
N – 5 bar (72 psi)

4 Check location (second element of dual model)

Only available as model type
DGMDC-3-Y-A*-B*-4*
B – B line

5 Check valve opening/ cracking pressure (second function of dual model)

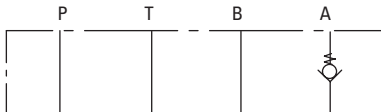
Options as in 3

6 Design number, 40 series

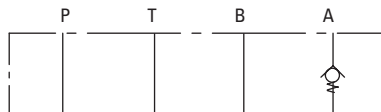
Subject to change. Installation dimensions unchanged for design numbers 40 to 49 inclusive.

Functional Symbols

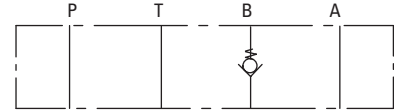
DGMDC-3-X-A*



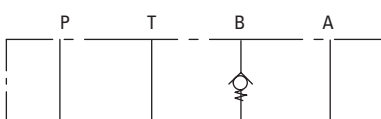
DGMDC-3-Y-A*



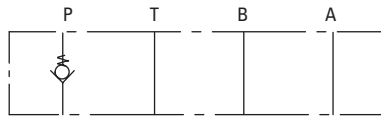
DGMDC-3-X-B*



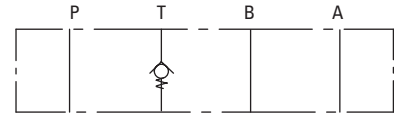
DGMDC-3-Y-B*



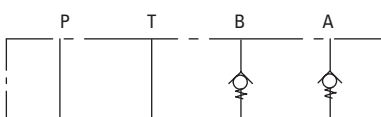
DGMDC-3-Y-P*



DGMDC-3-X-T*



DGMDC-3-Y-A*-B*



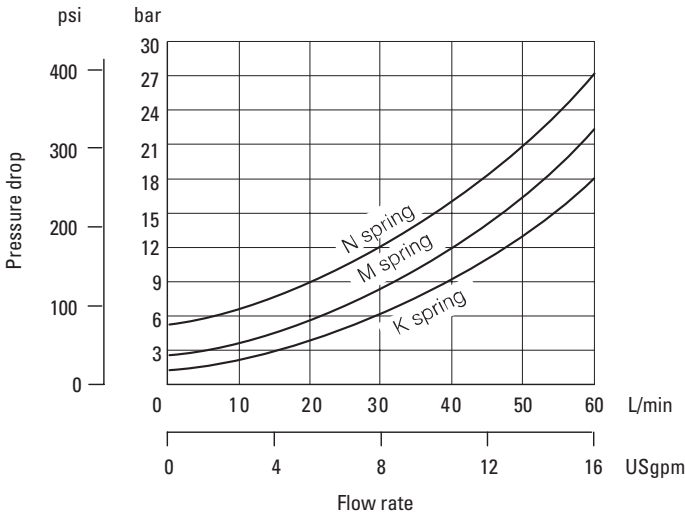
Operating Data

Maximum flow rate	60 L/min (16 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Pressure drops	See graphs
Mounting position	Optional
Mass approximate	1 kg (2.2 lb)

Performance Characteristics

Typical performance with mineral oil at 21 cSt (102 SUS) and at 50°C(122°F) ●

Pressure drop: free flow through check valve



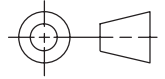
● For other viscosities, see “Further Information”.

Internal Leakage Across Closed Check Valve

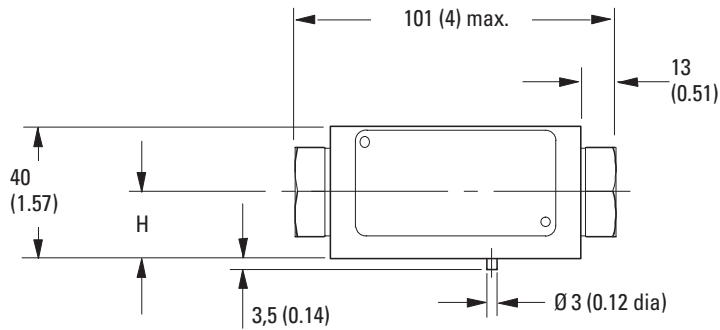
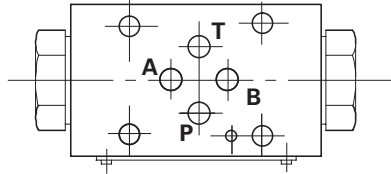
Less than 0,25 ml/min (0.015 in³/min) at 250 bar (3625 psi)

M

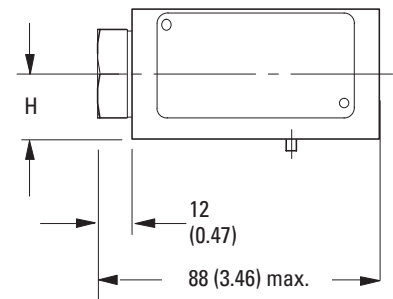
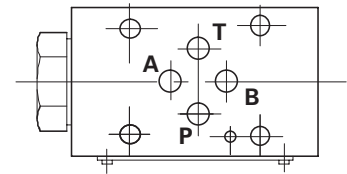
Installation Dimensions in mm (inches)



DGMDC-3-Y-A*-B*-41

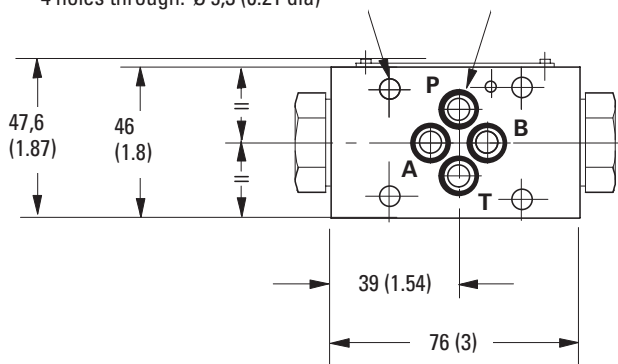


DGMDC-3-X-A*-41
DGMDC-3-X-T*-41
DGMDC-3-Y-A*-41
DGMDC-3-Y-P*-41

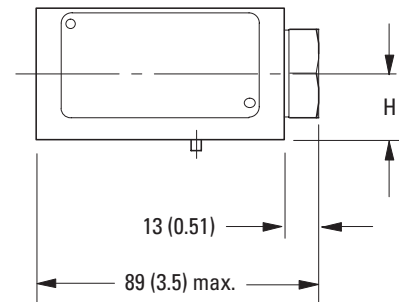


4 holes through: Ø 5,3 (0.21 dia)

4 off "O" seals supplied for this mounting face



DGMDC-3-X-B*-41
DGMDC-3-Y-B*-41



Model Type	H
DGMDC-3-X-A*-41	
DGMDC-3-X-B*-41	16,75
DGMDC-3-Y-P*-41	(0.66)
DGMDC-3-X-T*-41	
DGMDC-3-Y-A*-41	23,25
DGMDC-3-Y-B*-41	(0.92)
DGMDC-3-Y-A*-B*-41	

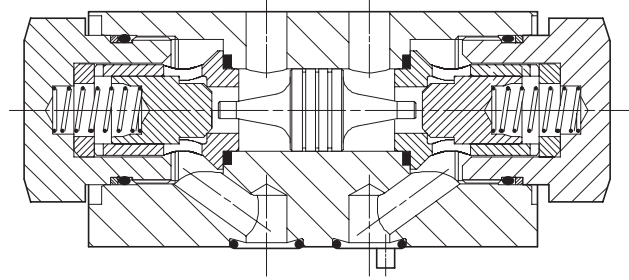
DGMPC-3-41

General Description

These valves provide pilot operated check functions in one or both service lines (A or B), the operating pilot supply coming from the opposite service line. Thus with pressure in one service line the check valve in the other service line will be open (subject to system/actuator pressures being correct for the valve area ratios).

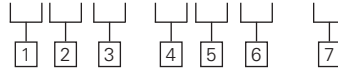
A 3:1 area ratio of pilot piston to check valve seat is supplemented by an optional 10:1 decompression feature.

Typical Section



Model Code

DGMPC -3- (D)** * [-(D)** *] - 41



1 Decompression feature

D – 10:1 decompression ratio
Omit if not required

2 Function

AB – Check in line A, pilot operated from line B
D – Check in line B, pilot operated from line A (single check model only)

3 Check valve opening/cracking pressure

K – 1 bar (14.5 psi)
M – 2,5 bar (36 psi)
N – 5 bar (72 psi)

4 Decompression feature (second function of dual models)

As in 1
Omit for single line models, and if not required for dual models

Note: "D" must be specified here, for dual models, if called for in 1

5 Second function of dual models

BA – Check in line B, pilot operated from line A
Omit for single line models

6 Check valve opening/cracking pressure (second function of dual models)

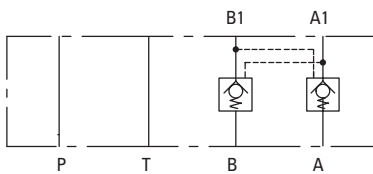
Options as in 3
Omit for single line models

7 Design number, 41 series

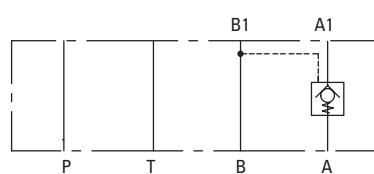
Subject to change. Installation dimensions unchanged for design numbers 40 to 49 inclusive.

M Functional Symbols

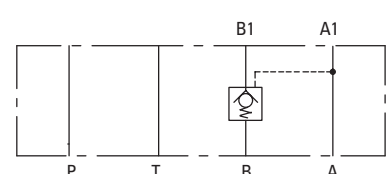
DGMPC-3-(D)AB*-(D)BA*



DGMPC-3-(D)AB*



DGMPC-3-(D)BA*



Operating Data

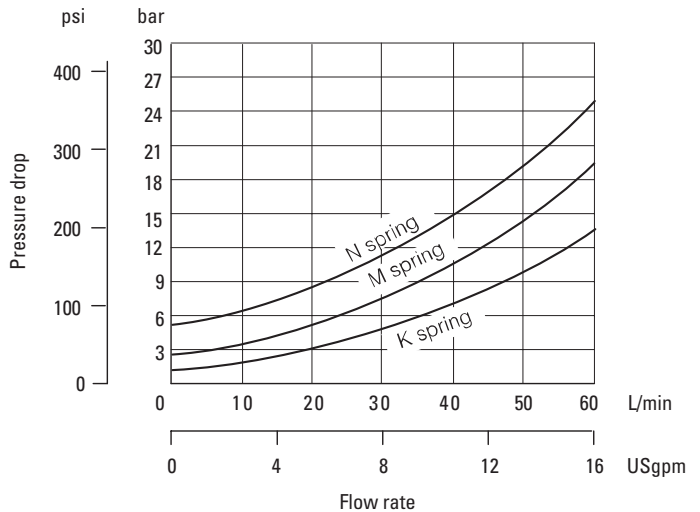
Maximum flow rate	60 L/min (16 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Pressure drops	See graphs
Mounting position	Optional
Mass approximate	0.8 kg (1.81 lb)

Performance Data

Pressure Drop Data

Typical performance with mineral oil at 21 cSt (102 SUS) and at 50°C(122°F)

Pressure drop: flow path A1 to A or B1 to B (no pilot-pressure operation)



u For other viscosities, see “Further Information”.

Pilot Pressures

Pilot area ratios:

Main check valve 3:1

Decompression poppet 10:1

Use applicable ratio and opening/cracking pressure to calculate pilot pressure to open valve element, applied to the following formulae:

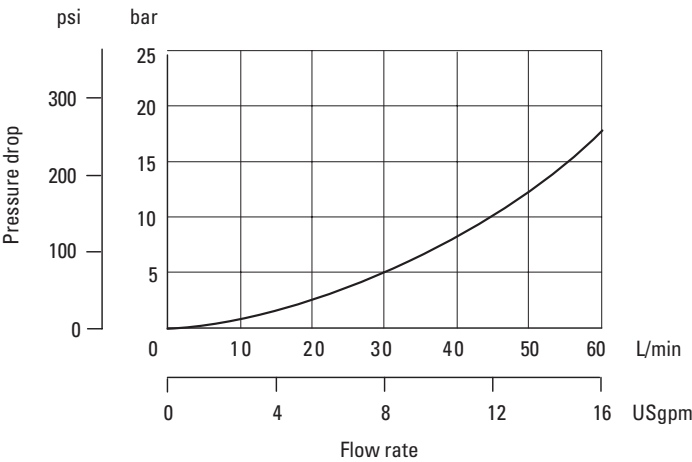
To open valve or decompression poppet in line A:

$$\text{Pressure at B1} = \frac{p_A + p_C - p_{A1}}{\text{Area ratio factor}} + p_{A1}$$

To open valve or decompression poppet in line B:

$$\text{Pressure at A1} = \frac{p_B + p_C - p_{B1}}{\text{Area ratio factor}} + p_{B1}$$

Pressure drop: flow path A to A1, or B to B1 with check valve pilot-operated fully open



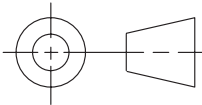
Where:

- p_A = Pressure at A
 - p_C = Cracking/opening pressure
 - p_{A1} = Pressure at A1
 - p_B = Pressure at B
 - p_{B1} = Pressure at B1
 - A =
 - B =
 - A1=
 - B1=
- Service line location;
see functional symbols

Leakage

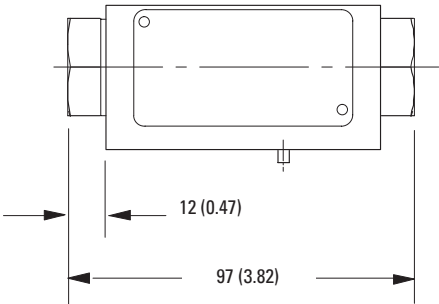
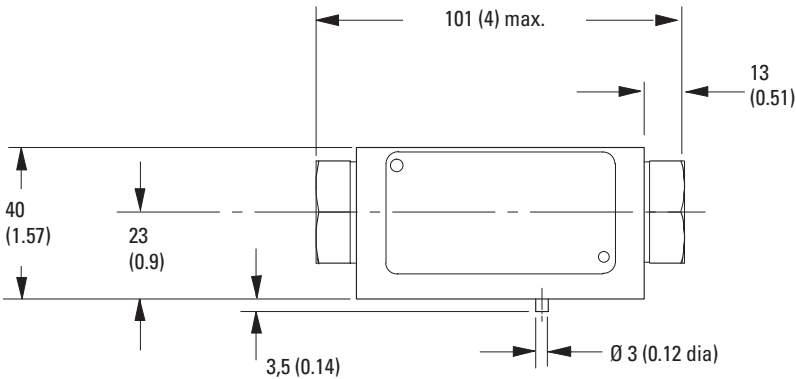
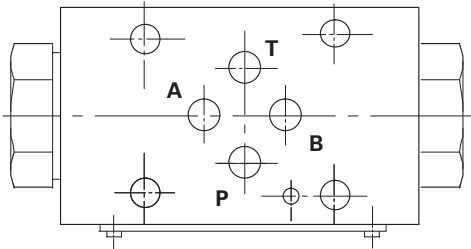
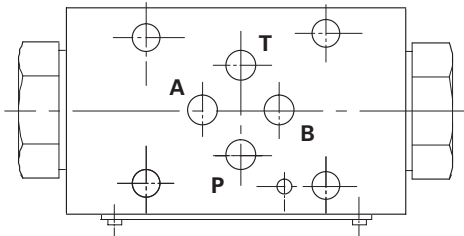
Less than 0,25 ml/min (0.015 in3/min) at 250 bar (3625 psi).

Installation Dimensions in mm (inches)



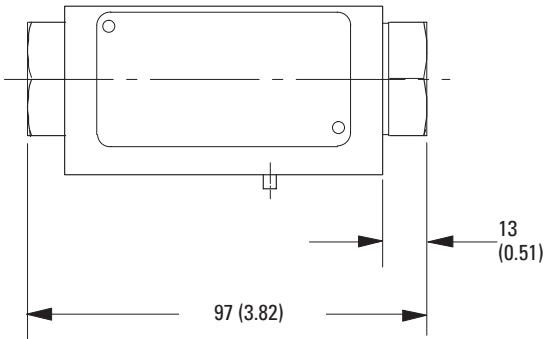
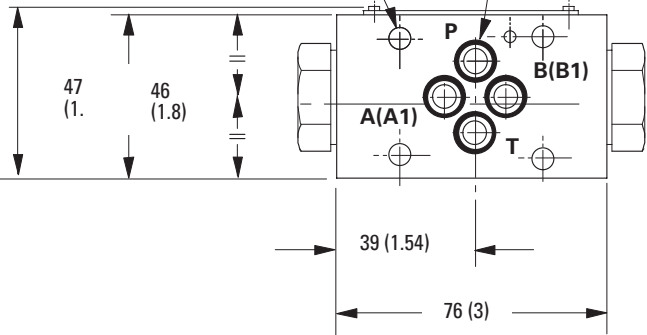
DGMPC-3-(D)AB*-(D)BA*-41

DGMPC-3-(D)AB*-41



4 holes through: Ø 5,3 (0.21 dia) 4 off "O" seals supplied for this mounting face

DGMPC-3-(D)BA*-41



DGMFN-3-41

General Description

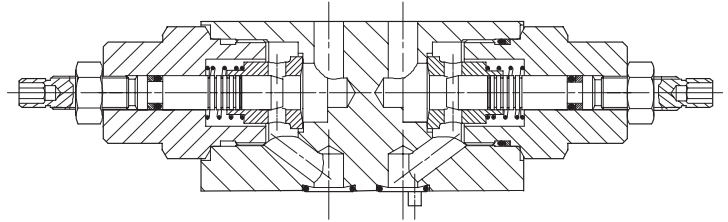
These valves regulate flow by means of an adjustable orifice which is not pressure compensated, and flow through the valve is entirely dependent upon pressure drop at any particular setting of the orifice.

Dual service-line models with an integral non-return valve around each control orifice provide for meter-in or meter-out control; single line versions of these are available.

For flow restriction in P or T lines (where reverse free flow is not required) models without check valves are available.

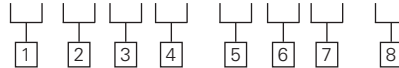
Adjustment options are either screw/locknut or handknob.

Typical Section



Model Code

DGMFN -3- * -* * * (-* * *) - 41



- [1] Direction of flow control (with respect to machine actuator)**
X – Meter-in control, applicable to lines A and B
Y – Meter-out control, applicable to lines A and B
Z – Meter-in control, line P only and meter-out control, line T only.

- [2] Location of control function (single model or first line of dual model)**
P – Line P (single model only)
T – Line T (single model only)
A – Line A (single model or first line of dual model)
B – Line B (single model only)

- [3] Type of control needle/orifice (single model or first line of dual model)**
1 – Fine control
2 – Standard control

- [4] Adjuster type (single model or first line of dual model)**
H – Handknob
W – Screw/locknut

- [5] Control in second line**
B – Line B (use for dual models with "A" specified at [2])
 Omit for single models

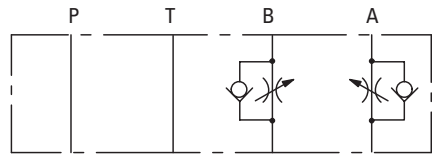
- [6] Type of control needle/orifice (second line of dual models)**
 Options as in [3]
 Omit for single models

- [7] Adjuster type (second line of dual models)**
 Options as in [4]
 Omit for single models

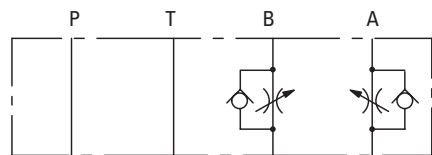
- [8] Design number, 41 series**
 Subject to change. Installation dimensions unaltered for design numbers 40 to 49 inclusive.

Functional Symbols

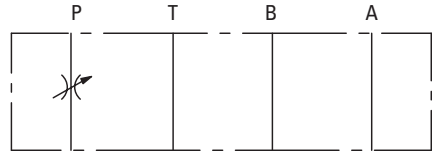
DGMFN-3-X-A**-B**



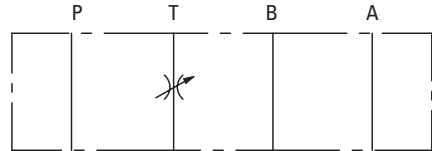
DGMFN-3-Y-A**-B**



DGMFN-3-Z-P**



DGMFN-3-Z-T**



Operational Data

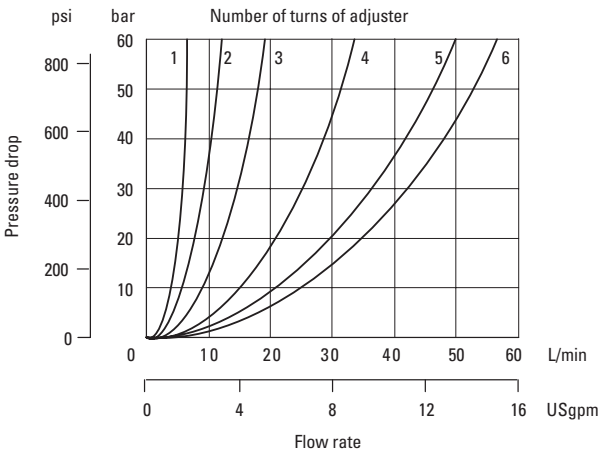
Maximum flow rate	60 L/min (16 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Pressure drops	See graphs
Mounting position	Optional
Mass approximate	1.1 kg (2.2 lb)

Performance Characteristics

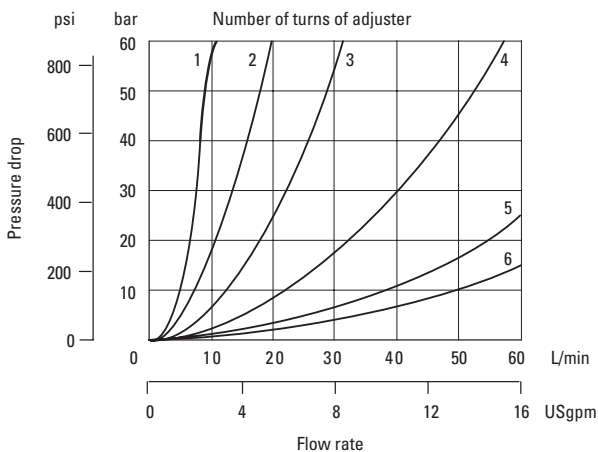
Pressure Drop

Typical performance with mineral oil at 21 cSt (102 SUS) and at 50° C(122° F) ●

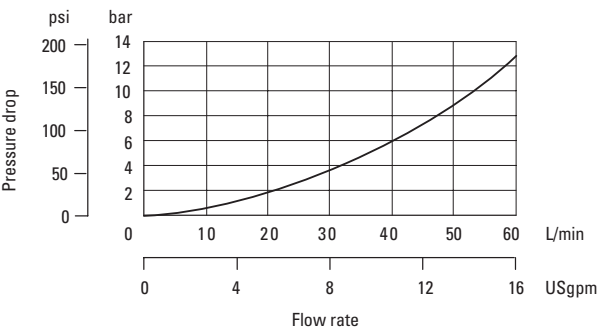
Type “1” needle (see model codes [3](#) and [6](#))



Type “2” needle (see model codes [3](#) and [6](#))



Free flow through check valve



● For other viscosities see “Further Information”.

Installation Dimensions in mm (inches)

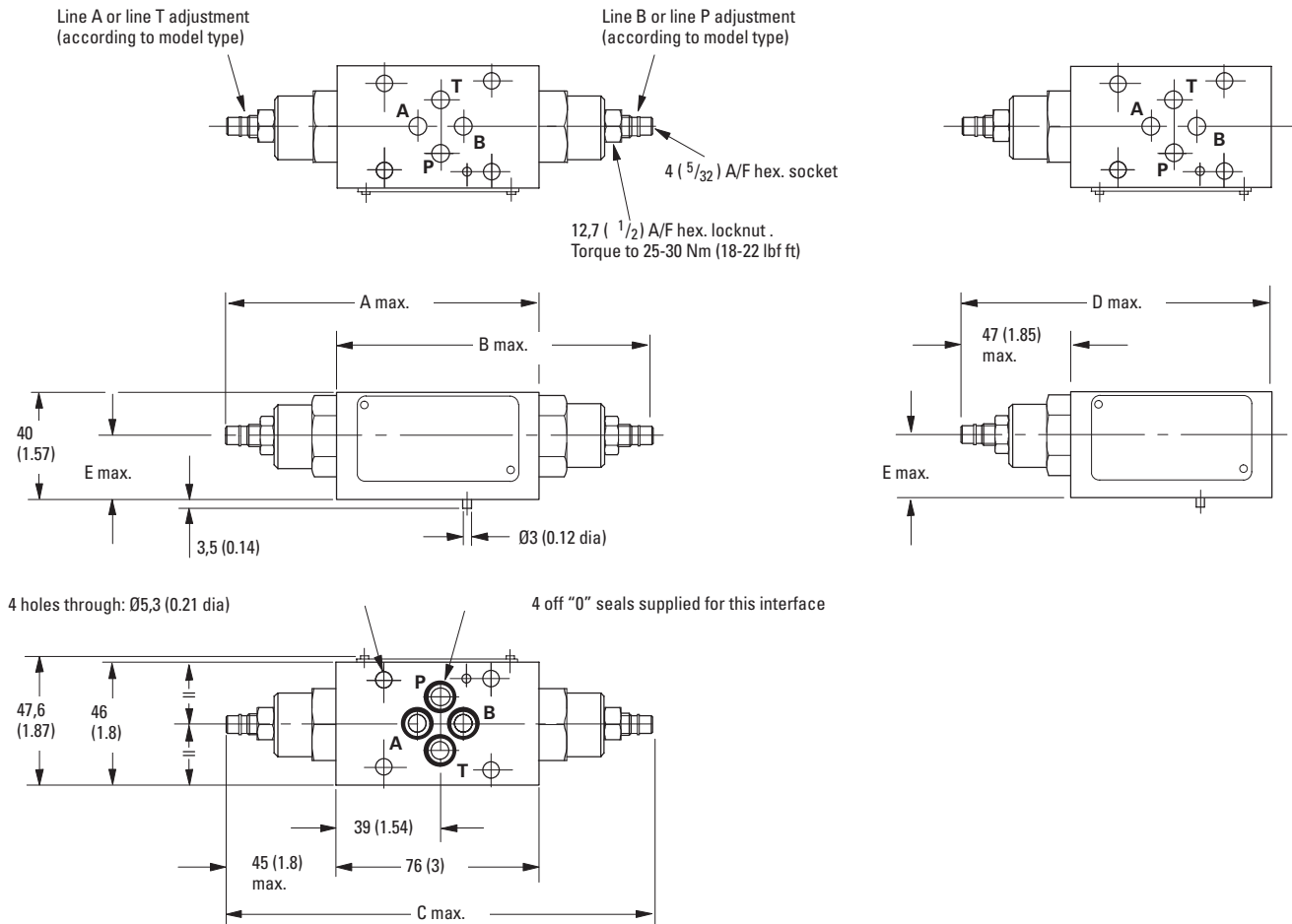
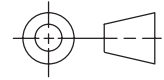
DGMFN-3-X-*(-***)-41**

DGMFN-3-Y-*(-***)-41**

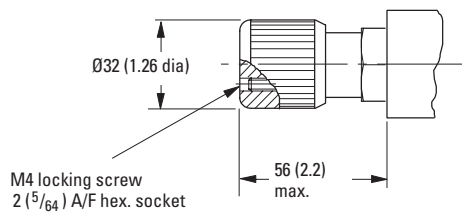
DGMFN-3-Z-*-41**

Models with type W adjuster

To adjust valve setting, slacken off locknut and turn screw ■
Re-tighten locknut after completing adjustment.



Type H adjuster



■ Turn clockwise to decrease flow (increase restriction);
counter-clockwise to increase flow (reduce restriction).

Model	A	B	C	D	E
DGMFN-3-X-A*W-41	121 (4.76)	—	—	—	16,75 (0.7)
DGMFN-3-X-A*W-B*W-41	—	—	167 (6.6)	—	16,75 (0.7)
DGMFN-3-X-B*W-41	—	122 (4.8)	—	—	16,75 (0.7)
DGMFN-3-Y-A*W-41	121 (4.76)	—	—	—	23,25 (0.9)
DGMFN-3-Y-A*W-B*W-41	—	—	167 (6.6)	—	23,25 (0.9)
DGMFN-3-Y-B*W-41	—	122 (4.8)	—	—	23,25 (0.9)
DGMFN-3-Z-P*W-41	—	—	—	123 (4.8)	16,75 (0.7)
DGMFN-3-Z-T*W-41	—	—	—	123 (4.8)	23,25 (0.9)

Further Information

Mounting Bolts, Subplates and Manifold Blocks

Mounting Bolts

The length of mounting bolt used to install a SystemStak assembly is dependent on the number of valves being used, plus the length needed for mounting other valves in the assembly, such as:

- solenoid operated, or other type of directional valve
- tapping plate
- blanking or crossover plate

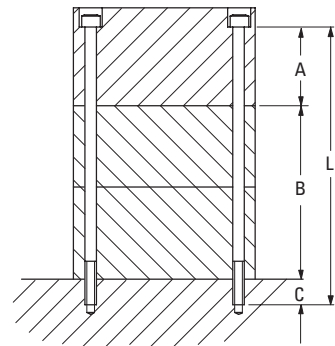
Eaton offers a large selection of bolt kits (one bolt kit for these SystemStak valves comprises 4 bolts) in metric and inch sizes as listed. To determine your needs, use the following guide for bolt length calculation.

Bolt Kit Selection

Metric: M5-6g		Inch: 10-24 UNC-3A	
Length (mm)	Eaton bolt kit number	Length (in)	Eaton bolt kit number
50	BKDG3699M	2.0	BKDG3698
60	BK466836M	2.375	BK466849
70	BK464125M	2.75	BK870017
80	BK466837M	3.125	BK466850
90	BK466838M	3.5	BK466851
100	BK466839M	3.937	BK466852
110	BK466840M	4.312	BK466853
120	BK466841M	4.75	BK466854
130	BK466842M	5.125	BK466855
140	BK466843M	5.5	BK466856
150	BK466844M	5.937	BK466857
160	BK466845M	6.312	BK466858
170	BK466846M	6.687	BK466859

Subplates and Manifold Blocks

See “Subplates and Auxiliary Connection Plates” catalog 2425.



A = Bolt clamp length in directional valve, blanking plate, crossover plate, etc.

B = Height of intermediate valve stack, comprising Eaton SystemStak valve(s) plus tapping plates, etc.

C = Depth of thread engagement in subplate/ manifold block: 8/10 mm (0.3/0.4), valid for: 315 bar (4500 psi) when using cast iron or steel subplates/manifold blocks, or 210 bar (3045 psi) when using Eaton aluminium alloy manifold blocks.

L = Required bolt length; select from the table.

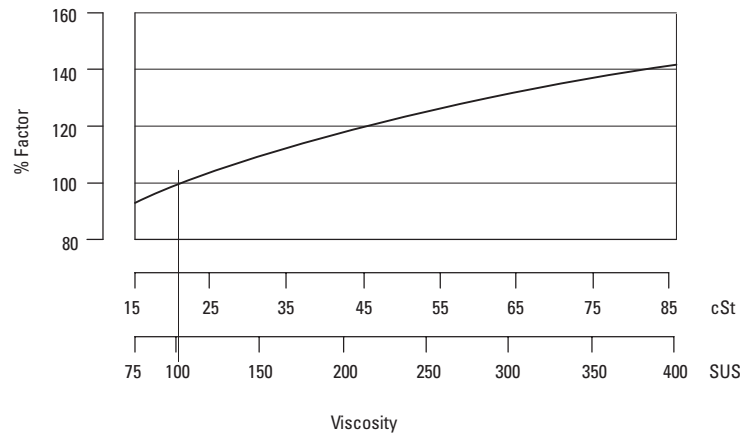
Notes

1. Bolts should be torqued to 7-9 Nm (63-80 lbf in) with threads lubricated.
2. If not using Eaton bolt kits, bolts must be to Grade 12.9 (ISO 898) or better.

Further Information

Pressure Drop at Other Viscosities

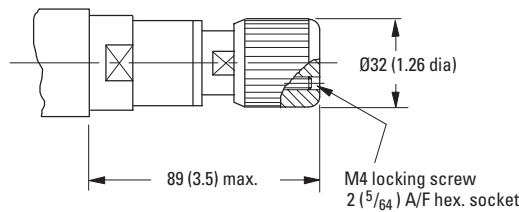
Published pressure drop data is valid for a fluid viscosity of 21 cSt (102 SUS). The graph shows the approximate percentage change in pressure drop for a range of other viscosities. To determine the approximate pressure drop for any given fluid viscosity, multiply the published data by the % factor for the required viscosity.



Type H Adjuster

To adjust valve setting, slacken M4 locking screw and rotate knob ■. Re-tighten locking screw after completing adjustment.

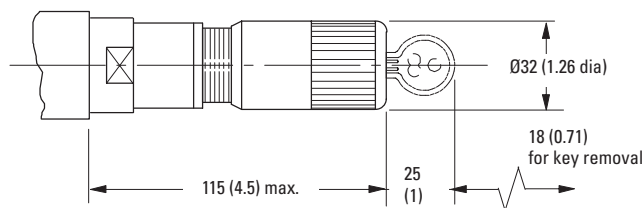
Available on
DGMC-3
DGMR-3
DGMX-3



Type K Adjuster

Key must be inserted and turned to allow valve to be adjusted ■. When key is removed, adjustment mechanism can be freely turned without changing valve setting.

Available on
DGMC-3
DGMR-3
DGMX-3



- Turn clockwise to increase pressure;
counter-clockwise to decrease pressure

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SystemStak™ Valves

ISO4401 Size 05

General Description

Eaton SystemStak™ valves make compact hydraulic systems in which modular valves are “sandwich” mounted between a directional valve and a standard mounting surface. Compact design improves system response by elimination of external fluid conductors, thereby resulting in elimination of resonant sounds which are noisy and lead to leakage. The design of these valves is well proven and offers opportunities for achieving small control assemblies, especially when the valves are used with multi-station manifolds.

Mounting surface is available for interfacing with directional valves and is coded “5” in the model numbers of Eaton SystemStak valves. The “5 interface accepts Eaton DG4S4 directional valves and other directional valves with a standard ISO 4401-05, NFPA-D05, ANSI/B93.7M size D05 or CETOP-5 port pattern.

Each valve “stak” can be configured to provide the specific combination of functions required to meet the system’s needs.

SystemStak valves are divided into two groups:

1. Valves acting in the pressure and/or tank lines (“P” and/or “T”)

DGMC	Relief valve
DGMDC	Direct check
DGMFN	Flow control
DGMR1	Sequence valve
DGMX2	Pressure reducing

The general rule for this group is that the DGMC relief valve be placed nearest the subplate or manifold. The DGMDC direct check valve should be placed nearest the directional control valve.

The DGMR1 sequence valve should be the farthest valve from the directional valve. The DGMR1 must be mounted directly to a subplate or manifold with a drain port, to externally drain the DGMR1 at the mounting face.

2. Valves acting in the service lines (“A” and/or “B”)

DGMC	Relief valve
DGMC2	Dual relief valve
DGMDC	Direct check
DGMPC	Pilot operated check
DGMFN	Flow control
DGMR	Counterbalance

The general rule for this group is that the DGMC system relief valve be the farthest valve from the directional valve.

When using a DGMPC with a DGMFN (meter-out), the DGMPC should be nearest the directional valve.

Features and Benefits

- Reduced space requirements**
Stackable SystemStak valves, used with ISO 4401-05, CETOP 5 (NFPA-D05) directional controls, provide compact cost-effective control of actuator direction, speed and force.
- Reduced installed cost**
SystemStak valves eliminate all intervalve piping and connections, thereby reducing the number of potential leakage points. Installed cost is less than when using conventional subplate- or line-mounted valves.
- Versatile & easy to install**
SystemStak valves have all the internal passages necessary to serve the directional valve mounted above them. Any directional valve with a standard ISO 4401-05, NFPA-D05, ANSI/B93.7M size D05 or CETOP-5 port pattern can be used with ISO 4401-05 SystemStak valves.

- Eaton bolt-extender kits simplify valve installation by permitting each valve body to be separately and quickly installed, and correctly torqued down. The kits also allow the directional valve to be removed for service or replacement without disturbing the stack.
- Rugged & reliable**
Internal working parts are produced from hardened steel, and reside in a continuous-cast ductile (spheroidal graphite) iron body. Excellent reliability is ensured, even in high pressure applications. Working parts are serviceable without removing valves from the stack.

Easy to Understand, Easy to Design

SystemStak circuitry is best shown using slightly different symbols than those for traditional valve configurations. Each SystemStak symbol has the same basic form and size as shown in Figure 1.

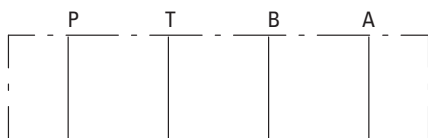


Figure 1.

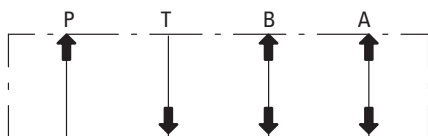


Figure 2.

For ease of understanding, remember the directions of flow for each line, and that all four flow paths pass through each valve (see Figure 2). For clarity, directional valves are drawn vertically in SystemStak circuit diagrams (see Figure 3.)

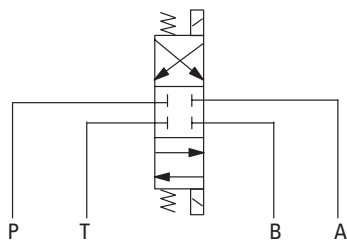


Figure 3.

Each station (valve stack) is a combination of functions. When designing and assembling SystemStak valves, care must be taken to ensure that they interact as required by stacking the functions in the correct sequence (see Figure 4). Direct check valves should be placed closest to the directional valve. Relief valves should normally be positioned next to the mounting surface (i.e. at the bottom of the stack). When both a flow control and a pilot operated check valve is required, it is recommended that the flow control valve be between the check valve and the actuator to prevent check valve chatter.

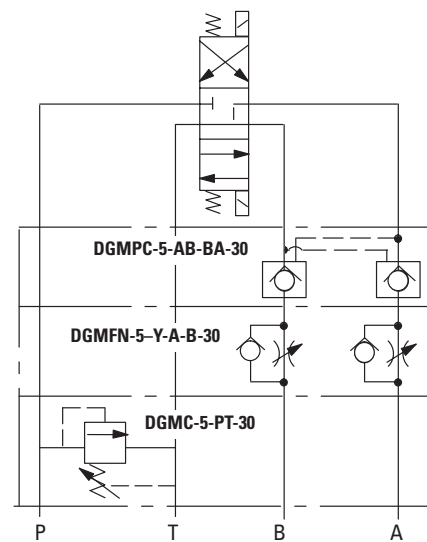


Figure 4.

A combination of directional valve, SystemStak valve(s) and subplate/ manifold block (Figure 5 single station subplate and Figure 6 multi station manifold) completes the assembly.



Figure 5.

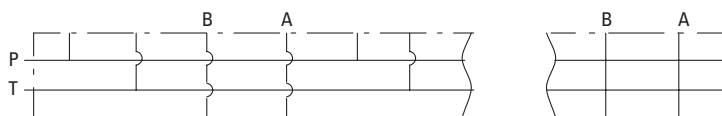


Figure 6.

Figure 7 represents a complete SystemStak system, showing typical use of functions available from this range. The circuit diagram also shows the use of a tapping plate for accessing line pressure readings, and a blanking plate to close off an unused station of a multi-station manifold.

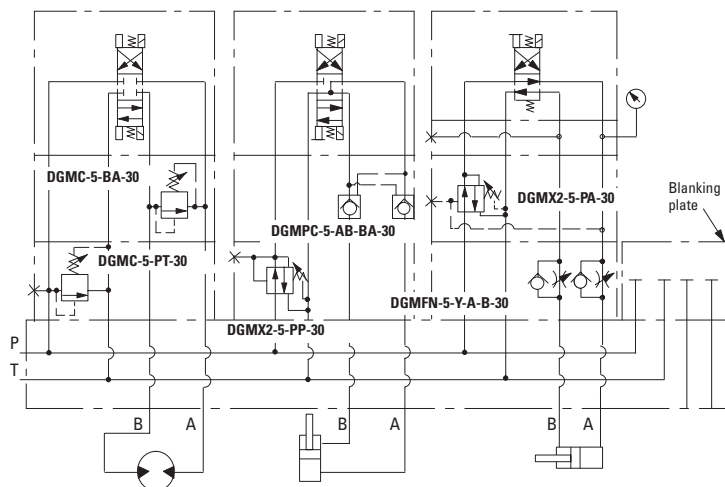
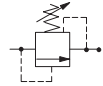
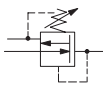
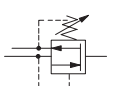
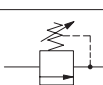
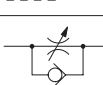
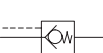
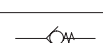


Figure 7.

Table of Contents

Function	Basic symbol	Basic model	Features	Page
Relief		DGMC/DCMC2	Single, dual and crossport models	5
Reducing/relieving		DGMX2	Piloted from (and reduced pressure in) port P, A or B	13
Sequence		DGMR1	Single port P sequence	17
Counterbalance		DGMR	Control in port T	20
Flow Control		DGMFN	Single or dual port, meter-in or meter-out	24
Pilot operated check		DGMPC	Single in port A or B; dual in ports A and B	29
Direct check		DGMDC	Single check in any port; dual check in ports A and B only	32

SystemStak™ Pilot Operated Relief Valves

DGMC/DGMC2

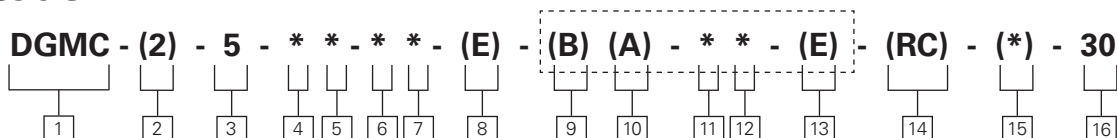
General Description

These two-stage valves limit system pressure by directing flow to tank or the opposite cylinder port (A-B/B-A crossport types) when system pressure reaches the valve setting.

Pressure control may be obtained in “A”, “B”, “A” and “B”, or “P” port, and pilot flow may be internally or externally drained, depending on model type. Any pressure in the line to which these valves are drained is additive to the valve pressure setting.

The valve pressure setting is adjustable by means of either an adjusting screw and locknut, a hand-knob adjuster, or a micrometer knob with keylock. External remote control/vent connections are available on all models except crossport relief. If required on crossport models, contact your Eaton representative.

Model Code



1 Valve function

Manifold or subplate mounted pressure relief valve.

2 Valve type

2 – Dual relief cavities

Blank – Single relief

3 Interface

5 – ISO 4401-AC-05-4-A, CETOP RP35H
ANSI/NFPA D05

4 Port operated upon

A – “A” cylinder port (single, dual or crossport types)

B – “B” cylinder port (single type only)

P – Pressure port (single type only)

5 Port drained into

A – “A” cylinder port

B – “B” cylinder port (crossport type only)

T – Tank port (single or dual types)

6 Pressure range

A – 4 to 50 bar (60 to 725 psi)

B – 4 to 100 bar (60 to 1450 psi)

F – 4 to 200 bar (60 to 2900 psi)

G – 4 to 315 bar (60 to 4500 psi)

7 Adjustment device

H – Knob adjuster

K – Micrometer knob with keylock

W – Screw with locknut

8 External drain

E – External drain

Omit for internal drain models.

9 P port acted upon

B – “B” cylinder port (dual or crossport type) Omit for single type.

10 Port drained into

A – “A” cylinder port (crossport type only)

T – Tank port (dual type only)

11 Pressure range

Omit for single type.

A – 4 to 50 bar (60 to 725 psi)

B – 4 to 100 bar (60 to 1450 psi)

F – 4 to 200 bar (60 to 2900 psi)

G – 4 to 315 bar (60 to 4500 psi)

12 Adjustment device

Omit for single relief models.

H – Knob adjuster

K – Micrometer knob with keylock

W – Screw with locknut

13 External drain

E – External drain same as position **8**

Omit for single relief models.

14 Remote control port

RC – Remote control port

Not available on crossport models.

15 Gage port & thread type

Gage port for P-T models only; optional remote control (RC) and external drain (E) ports as applicable.

Omit for crossport models

B – G 1/8” (1/8” BSPF)

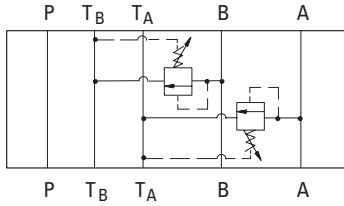
S – SAE-4 O-ring boss port
(0.4375-20 UNF-2B thread)

16 Design number - 30 series

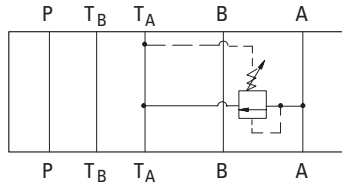
Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

Functional Symbols

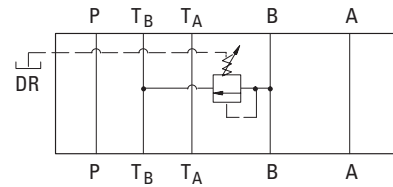
DGMC2-5-AT-**-BT-**-30



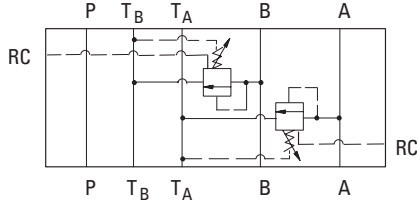
DGMC-5-AT-**-30



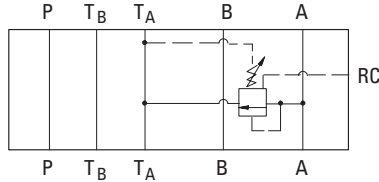
DGMC-5-BT-**-E-**-30



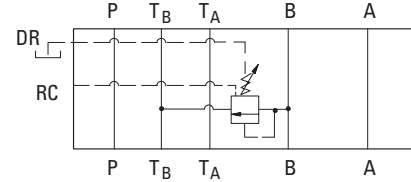
DGMC2-5-AT-**-BT-**-RC-**-30



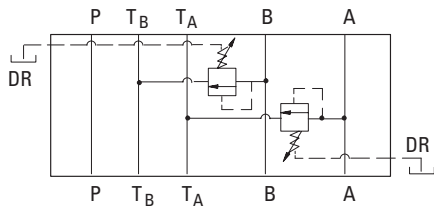
DGMC-5-AT-**-RC-**-30



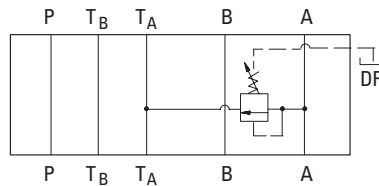
DGMC-5-BT-**-E-RC-**-30



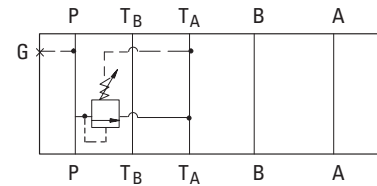
DGMC2-5-AT-**-E-BT-**-E-**-30



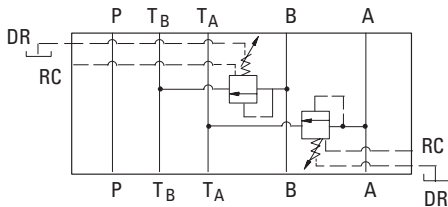
DGMC-5-AT-**-E-**-30



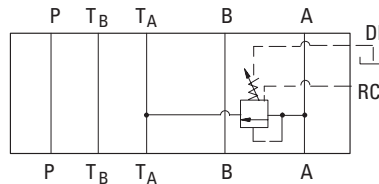
DGMC-5-PT-**-30



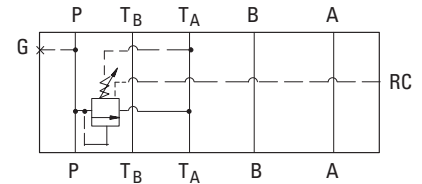
DGMC2-5-AT-**-E-BT-**-E-RC-**-30



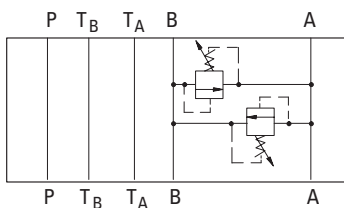
DGMC-5-AT-**-E-RC-**-30



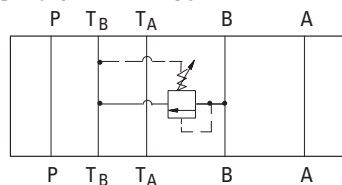
DGMC-5-PT-**-RC-**-30



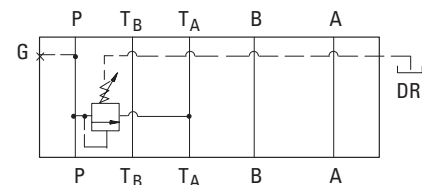
DGMC2-5-AB-**-BA-**-30



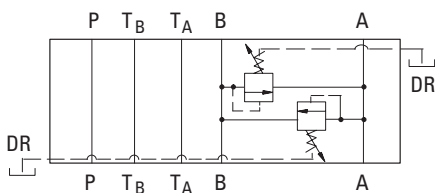
DGMC-5-BT-**-30



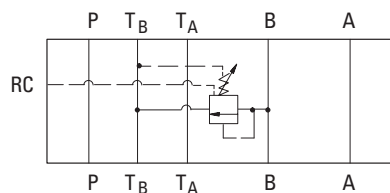
DGMC-5-PT-**-E-**-30



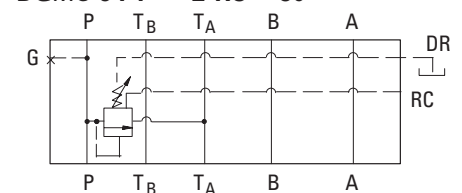
DGMC2-5-AB-**-E-BA-**-E-**-30



DGMC-5-BT-**-RC-**-30



DGMC-5-PT-**-E-RC-**-30



Operating Data

Basic Characteristics

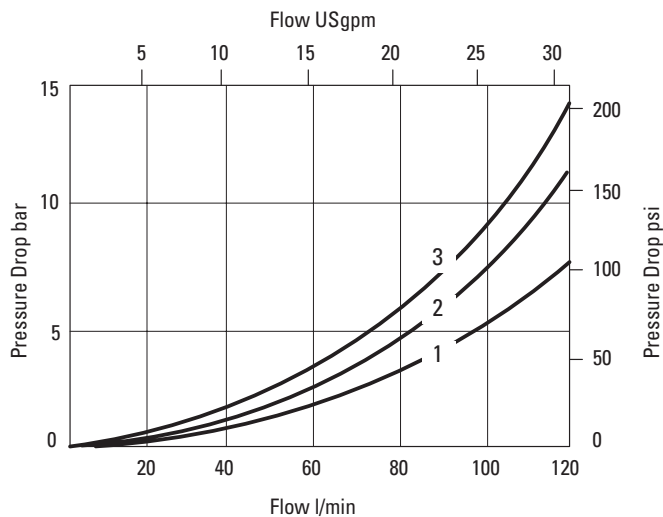
Maximum flow	120 l/min (32 USgpm)
Pilot flow@ 50°C (120°F) and 315 bar (4500 psi)	400–700 ml/min (24 in ³ /min-43 in ³ /min)
Maximum operating pressure	315 bar (4500 psi)ar (450 psi)
Pressure overshoot	31 bar (450 psi)
Operating temperature	-0° to 80°C (32° to 180°F)
Weights	DGMC 2,9 kg (6.5 lbs) DGMC2 3,6 kg (7.9 lbs)

Response time: For conditions of 5 liters (300 in³) of oil under compression and a flow rate of 120 l/min (32 USgpm) typical response is:

Initial pressure	Final pressure	Response time
17 bar (250 psi)	35 bar (500 psi)	95 ms
35 bar (500 psi)	140 bar (2000 psi)	110 ms
35 bar (500 psi)	315 bar (4500 psi)	150 ms

Performance Data

DGMC-5 and DGMC2-5 Insertion Loss



Insertion Loss

Total change in pressure drop from through ports "P" "B", "A" and "T" caused by the addition of the SystemStak valve to a hydraulic circuit. Insertion loss curves (see top left):

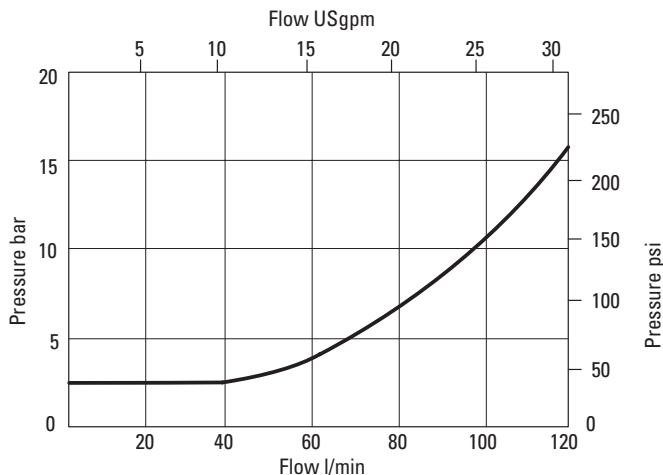
1. DGMC2-5-AT-**-*(E)-BT-**-*(E)-(RC)*-30
DGMC-5-AT-**-*(E)-(RC)*-30
DGMC-5-BT-**-*(E)(RC)*-30
2. DGMC-5-PT-**-*(E)-(RC)*-30
3. DGMC2-5-AB-**-BA-**-30

DGMC-5 and DGMC2-5 Pressure Override

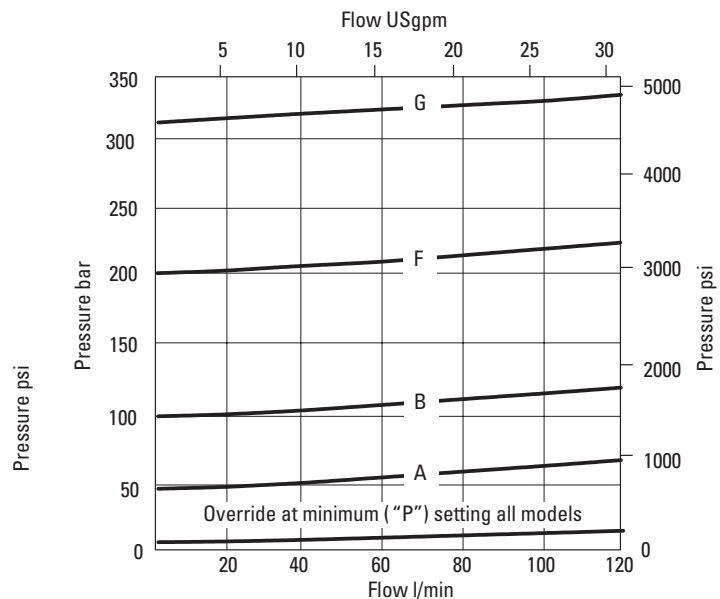
The pressure override chart (below) shows typical override of different adjustment ranges at maximum settings.

DGMC-5 and DGMC2-5 Vented Pressure (RC models only)

(Not applicable for crossport models)



The vented pressure chart (above) indicates flow from control port to discharge port over relief element.



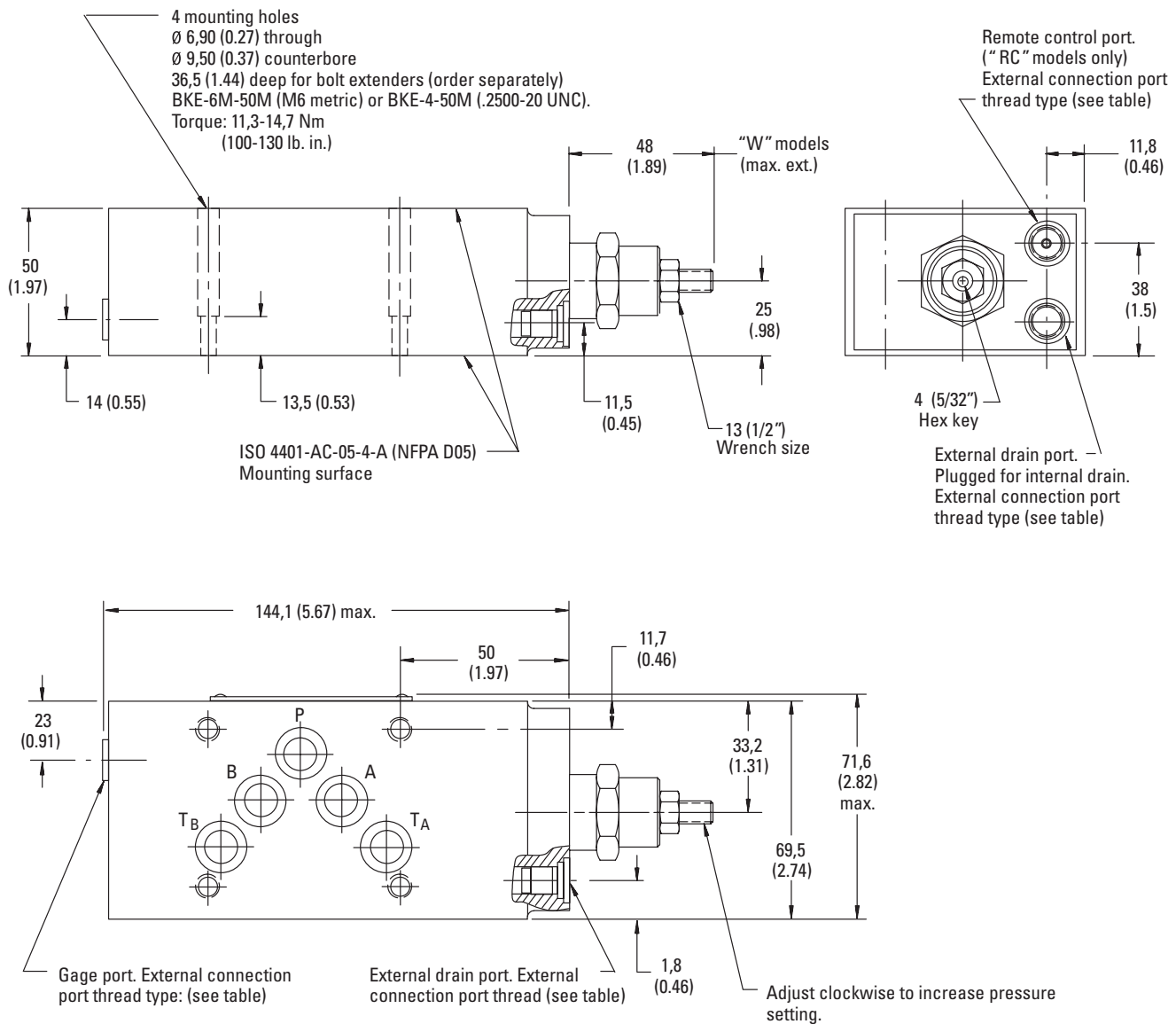
Installation Dimensions

DGMC-5-PT Single Relief

mm (inches)

See page 37 for optional adjustment devices.

See page 38 for interface dimensions.



External connection port threads

"S" models - SAE-4 O-ring boss port
 (0.4375-20 UNF-2B thread).

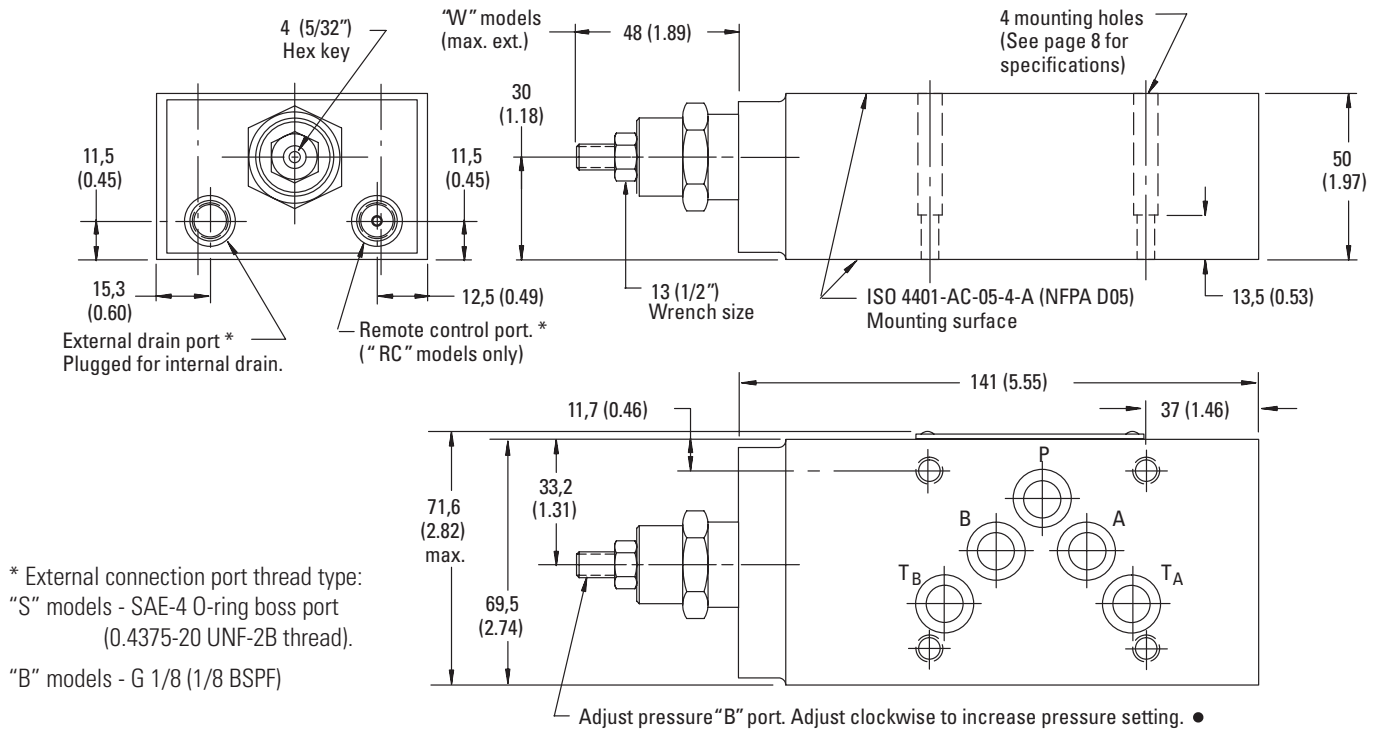
"B" models - G 1/8 (1/8 BSPF)

Note: Back pressure in drain is added to this
 setting for internal drain models only.

Installation Dimensions

DGMC-5-BT Single Relief

mm (inches)



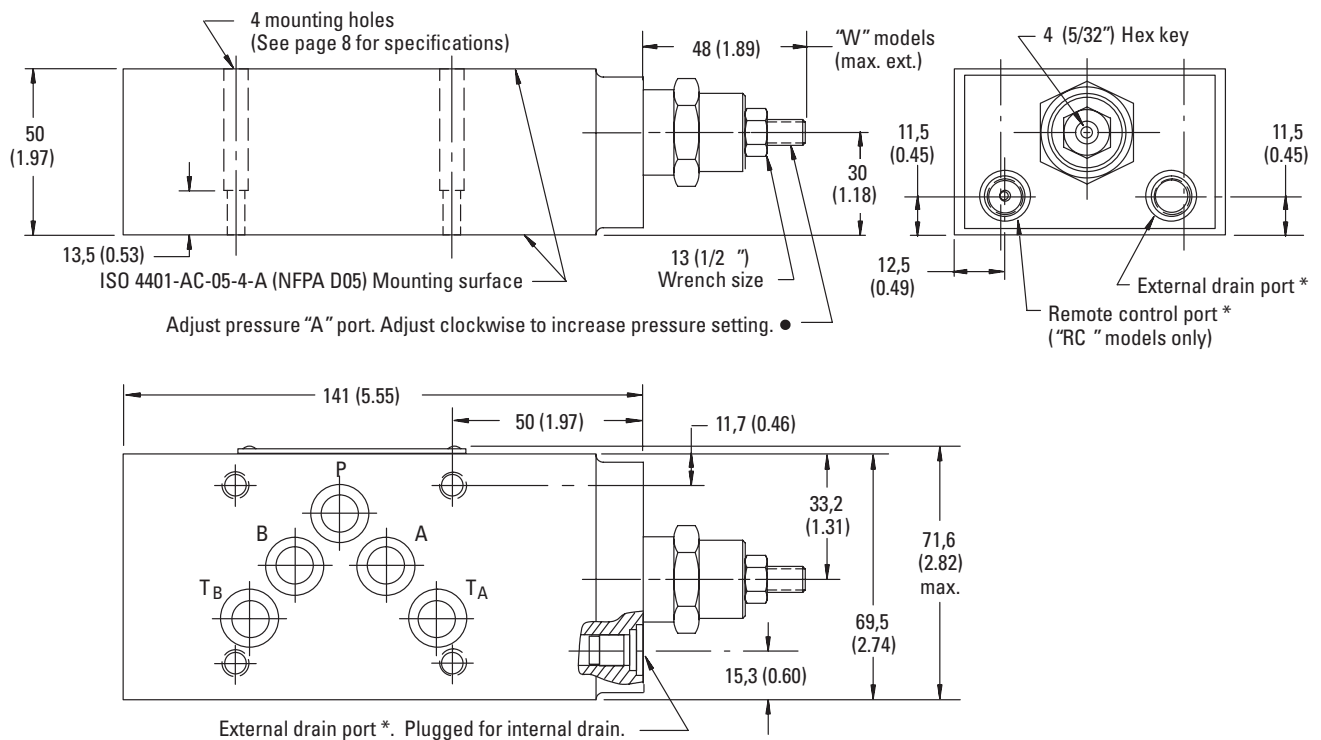
* External connection port thread type:
"S" models - SAE-4 O-ring boss port
(0.4375-20 UNF-2B thread).

"B" models - G 1/8 (1/8 BSPF)

See page 37 for optional adjustment devices.
See page 38 for interface dimensions.

- Back pressure in drain is added to this setting for internal drain models only.

DGMC-5-AT Single Relief



Installation Dimensions

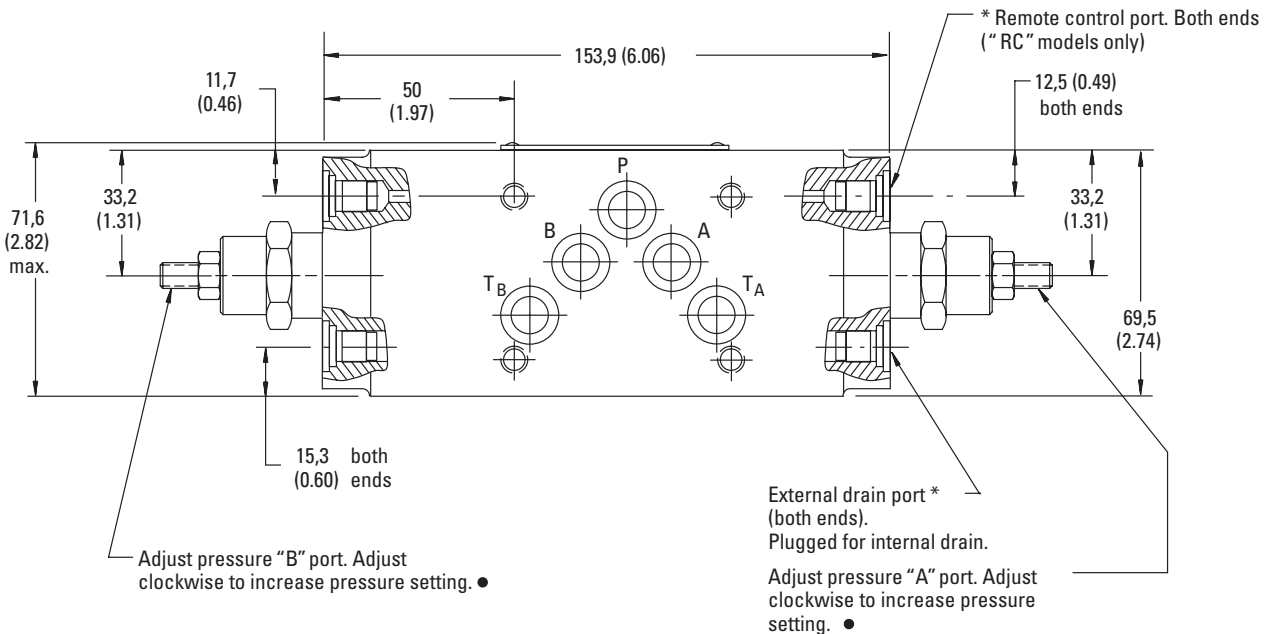
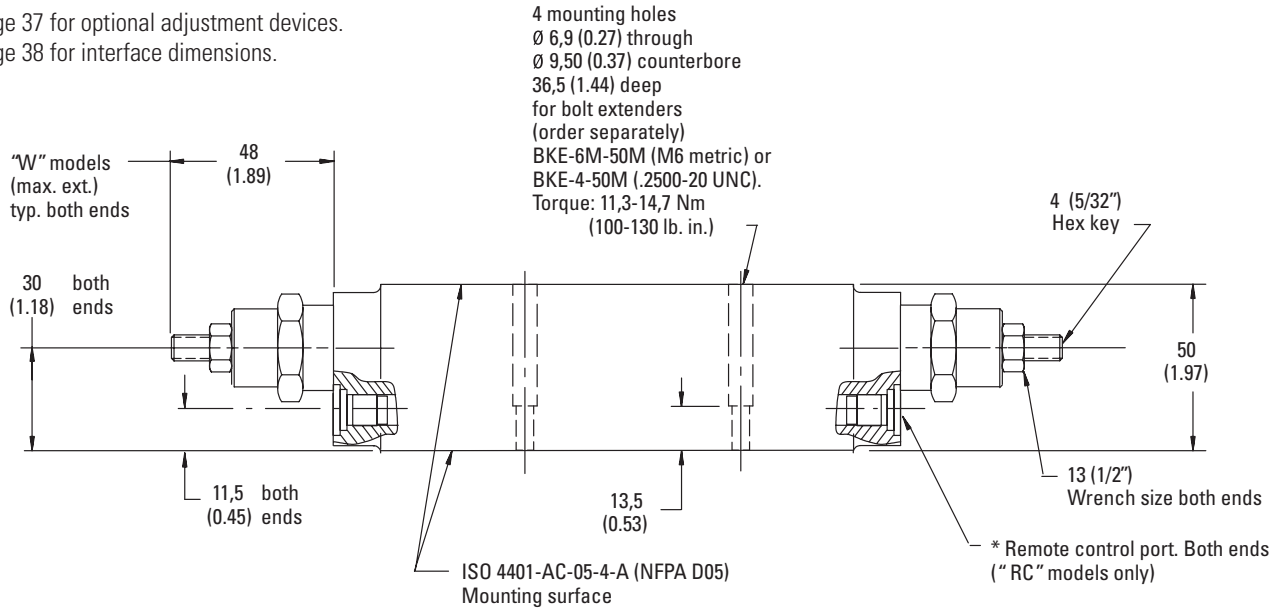
DGMC2-5-AT-**-BT-**-30

Dual Relief

mm (inches)

See page 37 for optional adjustment devices.

See page 38 for interface dimensions.



* External connection port thread type:

"S" models - SAE-4 O-ring boss port
 (0.4375-20 UNF-2B thread).

"B" models - G 1/8 (1/8 BSPF) 15 in model code

- Back pressure in drain is added to this setting for internal drain models only.

Installation Dimensions

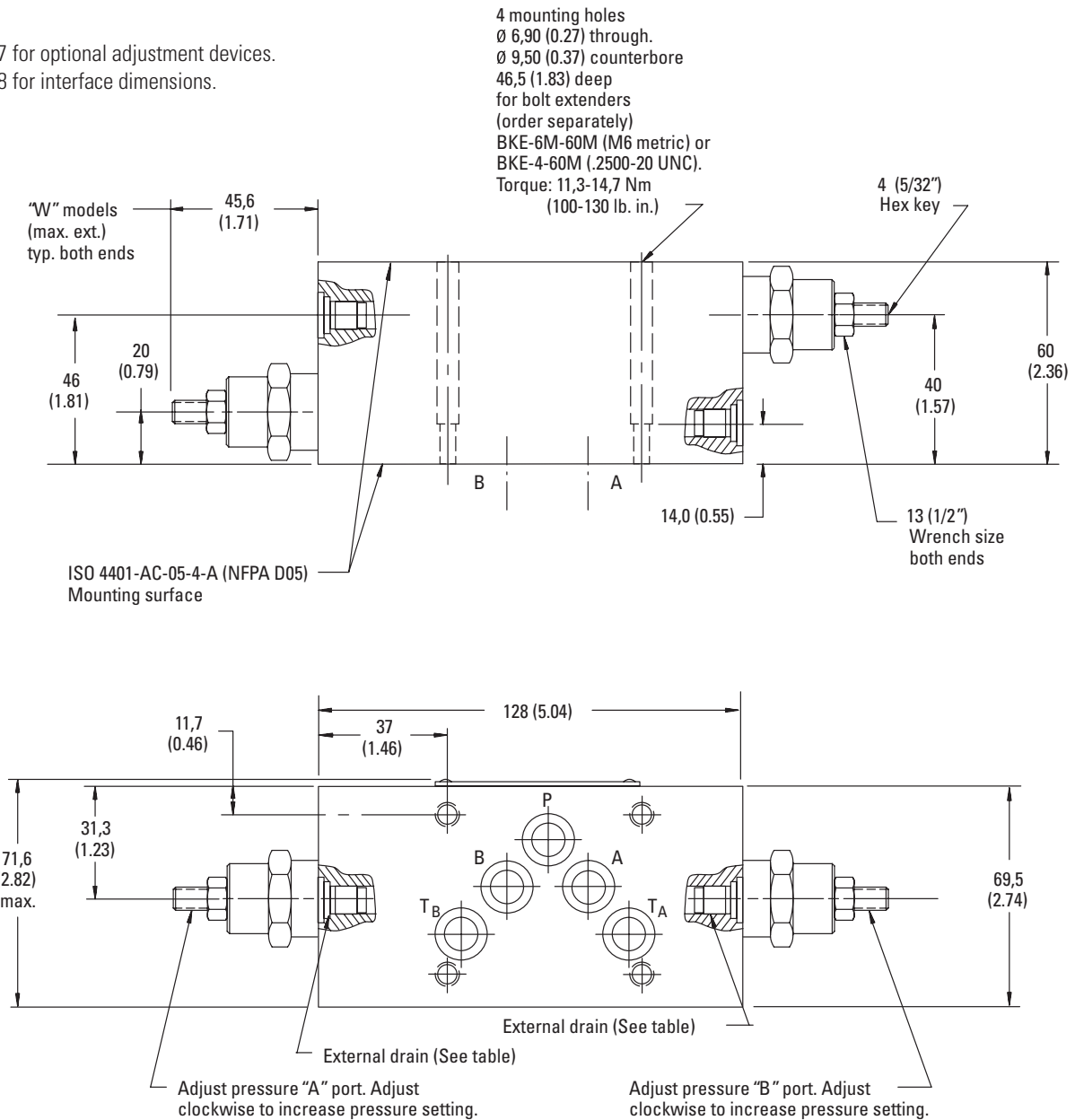
DGMC2-5-AB-**-BA-**-30

Dual Crossport Relief

mm (inches)

See page 37 for optional adjustment devices.

See page 38 for interface dimensions.



External drain port threads

"S" models - SAE-4 O-ring boss port
 (0.4375-20 UNF-2B thread).

"B" models - G 1/8 (1/8 BSPF)

Installation Dimensions

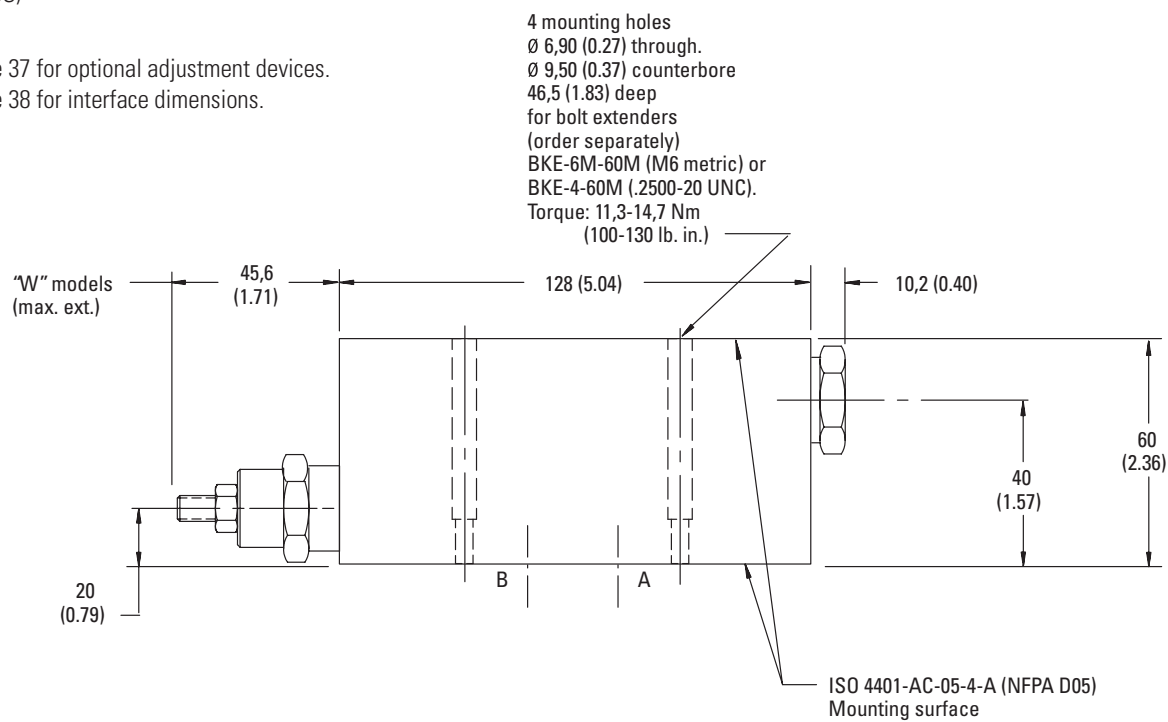
DGMC-5-AB**-*(E)-*-30

Single Crossport Relief

mm (inches)

See page 37 for optional adjustment devices.

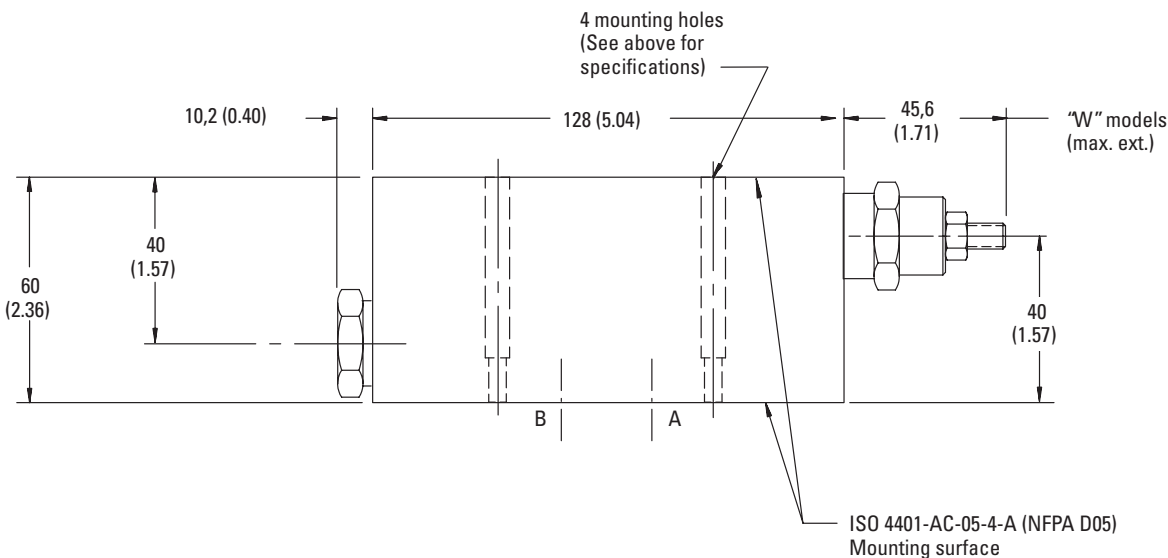
See page 38 for interface dimensions.



DGMC-5-BA**-*(E)-*-30

Single Crossport Relief

mm (inches)



SystemStak™ Pressure Reducing/Relieving Valves

DGMX2 General Description

These two-stage spool valves maintain a reduced outlet pressure against variations in inlet pressure.

These valves are able to act as relief valves (at 50% of maximum flow) to prevent excess pressure being developed when an actuator is subject to a reactive load. Relief flow is directed to the “T_B” port. Therefore, for the relief function to operate, all components above this DGMX2 module must contain the “T_B” port, and the directional valve must have the “T_B” bypass feature.

Pilot control may be from the “P”, “A”, or “B” port. Pilot drain flow may be directed internally to tank port “TA”, or externally out of the valve body.

Any pressure in the line to which these valves are drained is additive to the valve pressure setting.

The valve pressure setting is adjustable by means of either an adjusting screw containing an internal hex, a hand-adjust knob, or a micrometer knob with keylock.

Different spring ratings cover an overall pressure range from 2 to 315 bar (30-4500 psi).

The metering spool element in this design is always positioned in the “P” line (see symbols on page14). The connection of the pilot control line determines at which port the reduced pressure is obtained. For example:

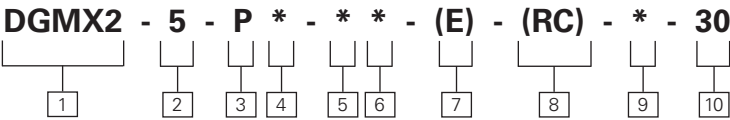
“PP” pilot for reduced pressure in “P” port

“PA” pilot for reduced pressure in “A” port

“PB” pilot for reduced pressure in “B” port

The “A” and “B” line models provide for reduced pressure when “P” is connected to “A” or “B”. It allows free flow through the service port when connected to “T” (all via a four-way directional valve).

Model Code



1 Valve function

Manifold or subplate mounted reducing/relieving valve.

2 Interface

5 – ISO 4401-AC-05-4-A, CETOP 5
RP35A size 5 ANSI/NFPA D05

3 Port operated upon

P – Pressure port

4 Pilot control

A – Cylinder port A
B – Cylinder port B
P – Pressure port

5 Pressure range

A – 2,0 to 50 bar (30 to 725 psi)
B – 8,5 to 100 bar (125 to 1450 psi)
F – 8,5 to 200 bar (125 to 2900 psi)
G – 8,5 to 315 bar (125 to 4500 psi)

6 Adjustment device

H – Knob adjuster
K – Micrometer knob with keylock
W – Screw with locknut

7 External drain

E – External drain
Omit for internal drain models.

8 Remote control

Omit if not required.

9 Gage port & thread type

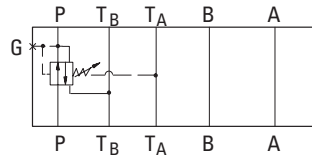
Gage port (all models), external drain (E)
B – G 1/8" (1/8" BSPF)
S – SAE-4 O-ring boss port
(0.4375-20 UNF-2B thread)

10 Design number - 30 series

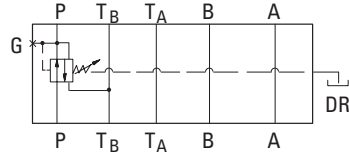
Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

Functional Symbols

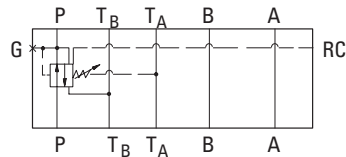
DGMX2-5-PP-**-30



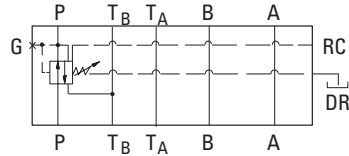
DGMX2-5-PP-**-E-30



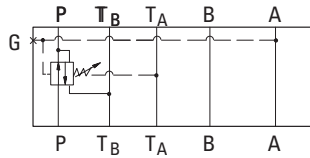
DGMX2-5-PP-**-RC-30



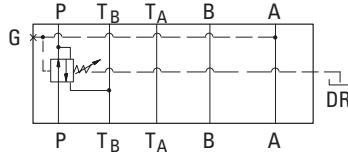
DGMX2-5-PP-**-E-RC-30



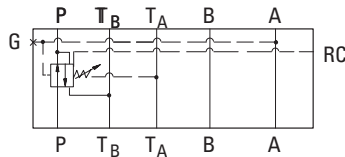
DGMX2-5-PA-**-30



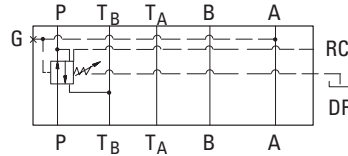
DGMX2-5-PA-**-E-30



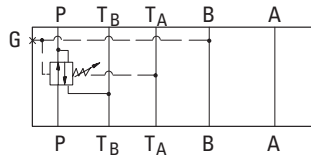
DGMX2-5-PA-**-RC-30



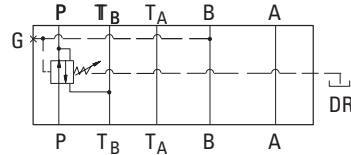
DGMX2-5-PA-**-E-RC-30



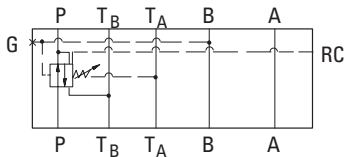
DGMX2-5-PB-**-30



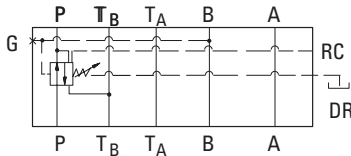
DGMX2-5-PB-**-E-30



DGMX2-5-PB-**-RC-30



DGMX2-5-PB-**-E-RC-30



Operating Data

Basic Characteristics

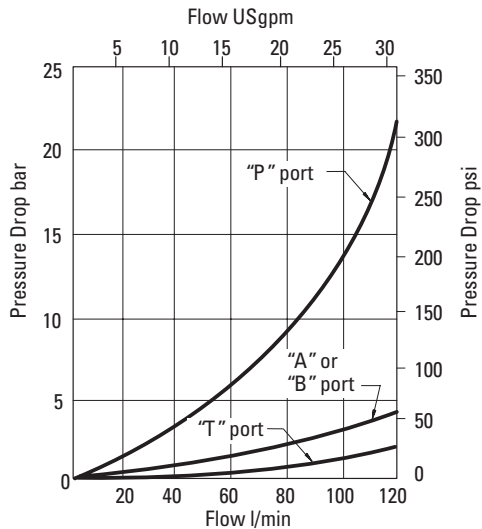
Maximum flow	120 l/min (32 USgpm)
Pilot flow @ 50°C (120°F) and 315 bar (4500 psi)	290–420 ml/min (18 in ³ /min–26 in ³ /min)
Maximum operating pressure	"A" models - 70 bar (1000 psi) * (inlet pressure) 50 bar (725 psi) (reduced pressure) "B", "F" & "G" models - 315 bar (4500 psi)
Leakage flow rate @ 50° C (120° F) and 315 bar (4500 psi)	80-200 ml/min (15-12 in ³ /min)
(Leakage to "Tb" around spool land @315 bar (4500 psi) Operating temperature -0° to 80°C (32° to 180°F)	
Weights	3,5 kg (7.7 lbs)

* Slightly higher pressure override characteristics between 70 bar (1000 psi) and 315 bar (4500 psi) inlet.

Performance Data

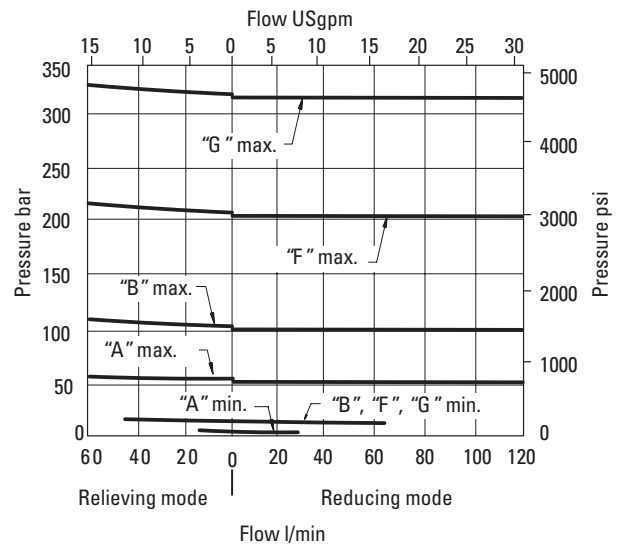
DGMX2 Insertion Lossess

These curves show the typical pressure drop for each flow path in the valve. The "P" port pressure drop is the pressure drop for flow across the reducing valve spool in the fully open condition. The total insertion loss for the valve must be calculated by summing the losses through each of the four flow paths.

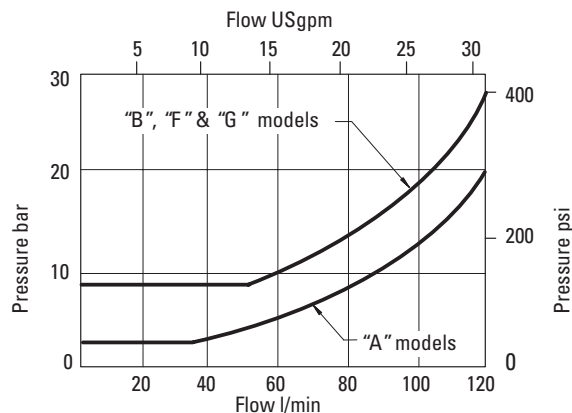


DGMX2 Pressure Override

These curves show the typical roll off or underide of the different pressure ranges at maximum settings. Also shown is the typical override of the relieving feature which prevents undesirable pressure rise in the reduced pressure port.



DGMX2 Minimum Reduced Pressure



The curves (left) show the minimum reduced pressure settings allowable for a given flow rate. The minimum pressure setting applies regardless of inlet pressure. Operation of the valve below minimum settings may cause erratic valve operation due to insufficient spring force to counter flow forces acting on the spool.

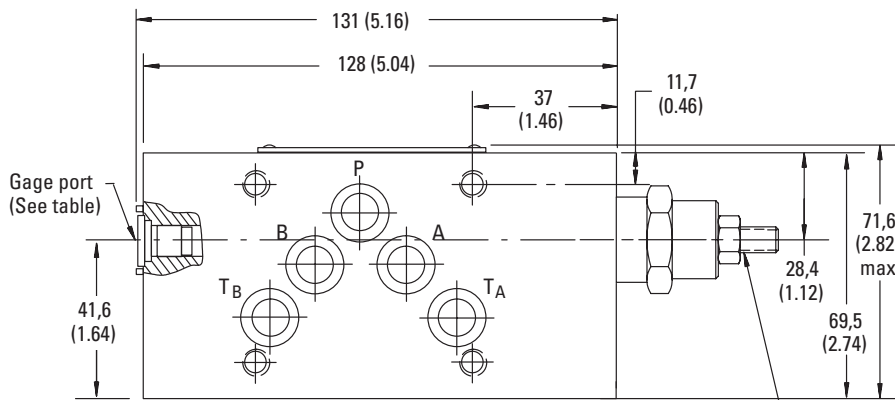
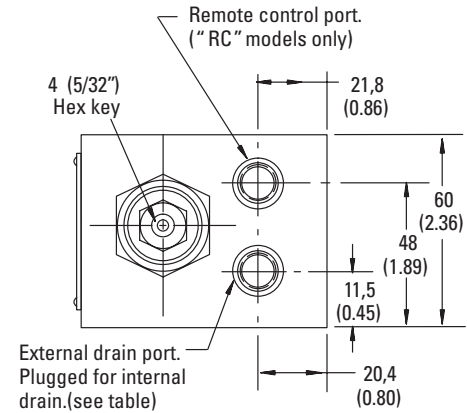
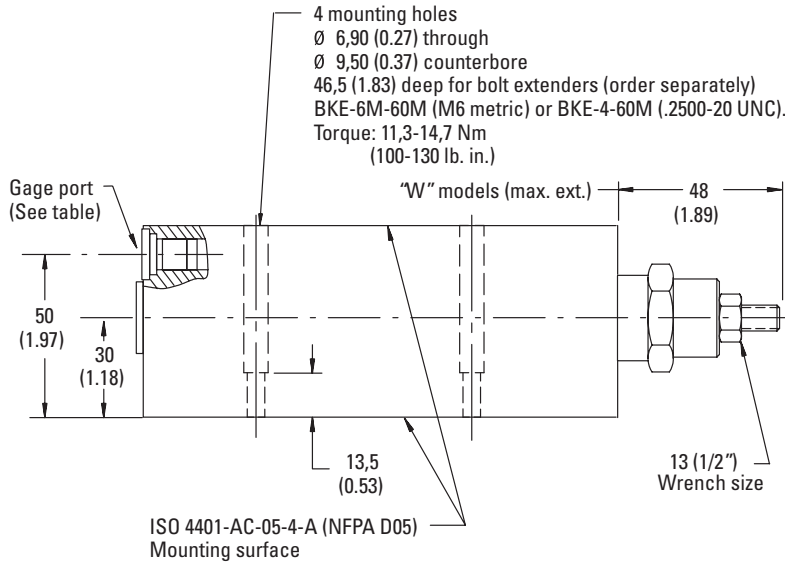
Installation Dimensions

DGMX2-5-PA/PB/PP Reducing/Relieving Valves

mm (inches)

See page 37 for optional adjustment devices.

See page 38 for interface dimensions.



Adjust clockwise to increase
 pressure setting.
 Note: Back pressure in drain
 is added to this setting for
 internal drain models only.

N External connection port threads
 "S" models - SAE-4 O-ring boss port
 (0.4375-20 UNF-2B thread).
 "B" models - G 1/8 (1/8 BSPF)

SystemStak™ Internal Pilot Operated Sequence Valves

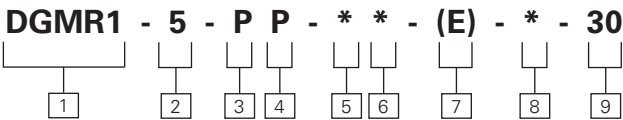
DGMR1 General Description

These two-stage pressure operated valves are normally closed to flow through the main spool flow path. When system pressure reaches or exceeds the valve setting, the main spool flow path opens. Pilot flow may be externally or internally drained to tank.

Any pressure in the line to which these valves are drained is additive to the valve pressure setting.

The valve pressure setting is adjustable by means of either an adjustable screw containing an internal hex, a hand-adjust knob, or a micrometer knob with keylock. Different spring ratings cover an overall pressure range from 5 to 315 bar (75-4500 psi).

Model Code



1 Valve function

Manifold or subplate mounted sequence valve.

2 Interface

5 – ISO 4401-AC-05-4-A, CETOP RP35H
Size 5 ANSI/NFPA D05

3 Port operated upon

P – Pressure port

4 Pilot control

P – Pressure port

5 Pressure range

A – 5 to 50 bar (75 to 725 psi)
B – 5 to 100 bar (75 to 1450 psi)
F – 5 to 200 bar (75 to 2900 psi)
G – 5 to 315 bar (75 to 4500 psi)

6 Adjustment device

H – Knob adjuster
K – Micrometer knob with keylock
W – Screw with locknut

7 External drain

E – External drain
Omit for internal drain models.

8 Gage port & thread type

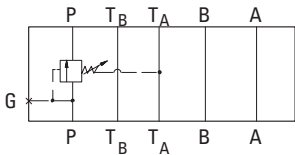
Gage port (all models), external drain (E) (optional).
B – G 1/8" (1/8" BSPF)
S – SAE-4 O-ring boss port
(0.4375-20 UNF-2B thread)

9 Design number - 30 series

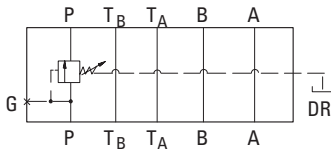
Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

Functional Symbols

DGMR1-5-PP-**-30



DGMR1-5-PP-**-E-30



Operating Data

Basic Characteristics	
Maximum flow	120 l/min (32 USgpm)
Pilot flow@ 50°C (120°F) and 315 bar (4500 psi)	400-500 ml/min (24-31 in³/min)
Maximum operating pressure	"A" models - 70 bar (1000 psi) * (inlet pressure) 50 bar (725 psi) (reduced pressure) "B", "F" & "G" models - 315 bar (4500 psi)
Leakage flow rate @ 50° C (120° F) and 315 bar (4500 psi)	80-200 ml/min (15-12 in³/min)
Operating temperature	-0° to 80°C (32° to 180°F)
Weights	3,5 kg (7.7 lbs)

Performance Data

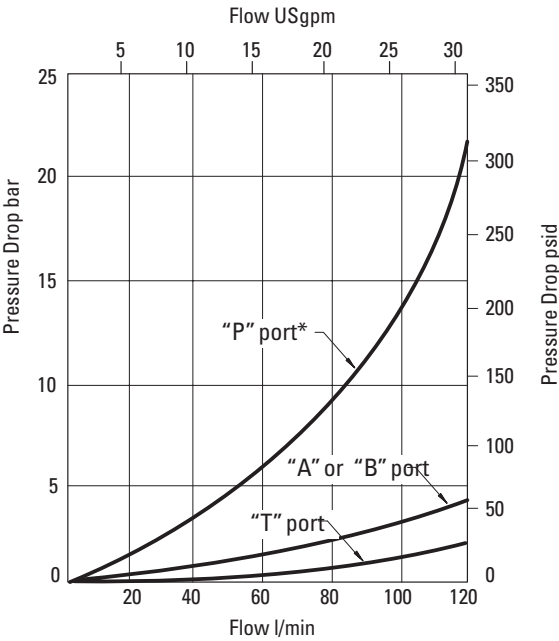
Insertion Losses

These curves show the typical pressure drop for each flow path in the valve. The "P" port pressure drop is the pressure drop for flow across the sequence valve spool in the fully open position.

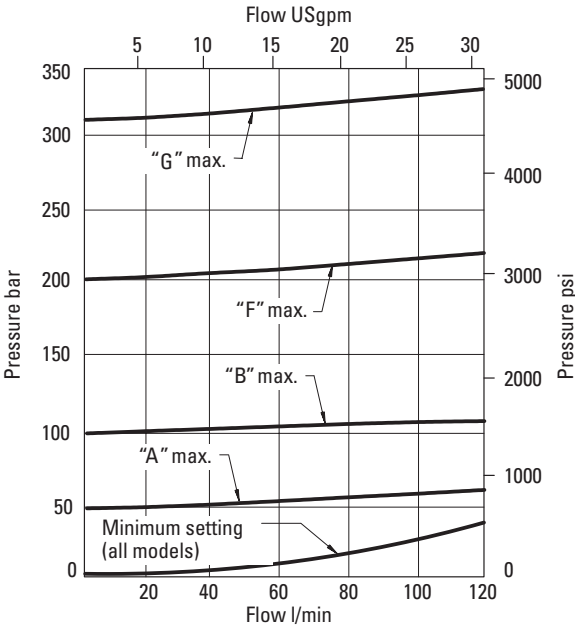
The total insertion loss for the valve must be calculated by summing the losses through each of the four flow paths.

Pressure Override

Typical pressure override of the different pressure ranges at minimum and maximum settings.



*Spool held in open position



Installation Dimensions

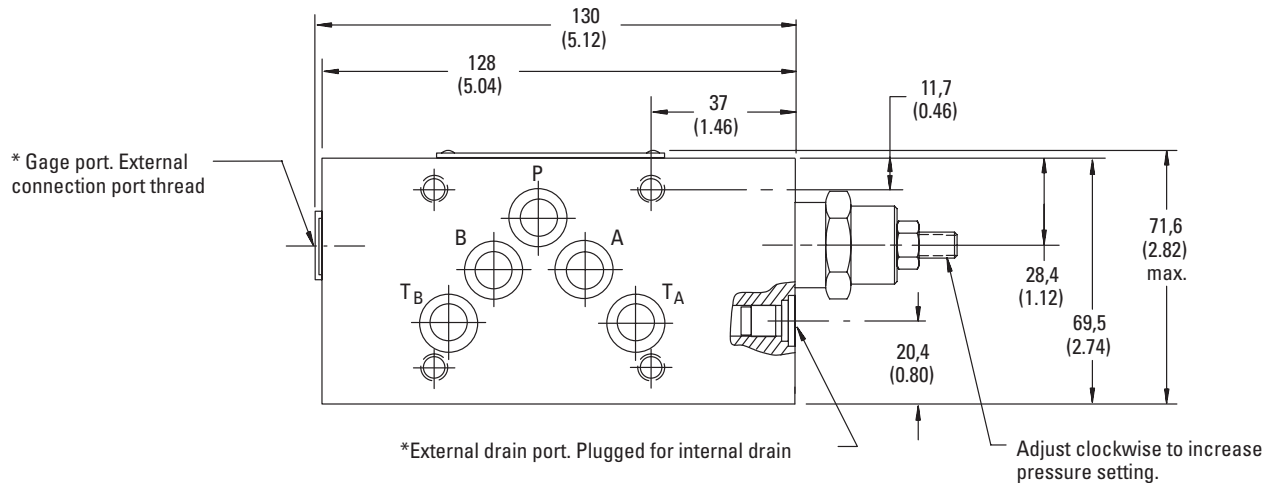
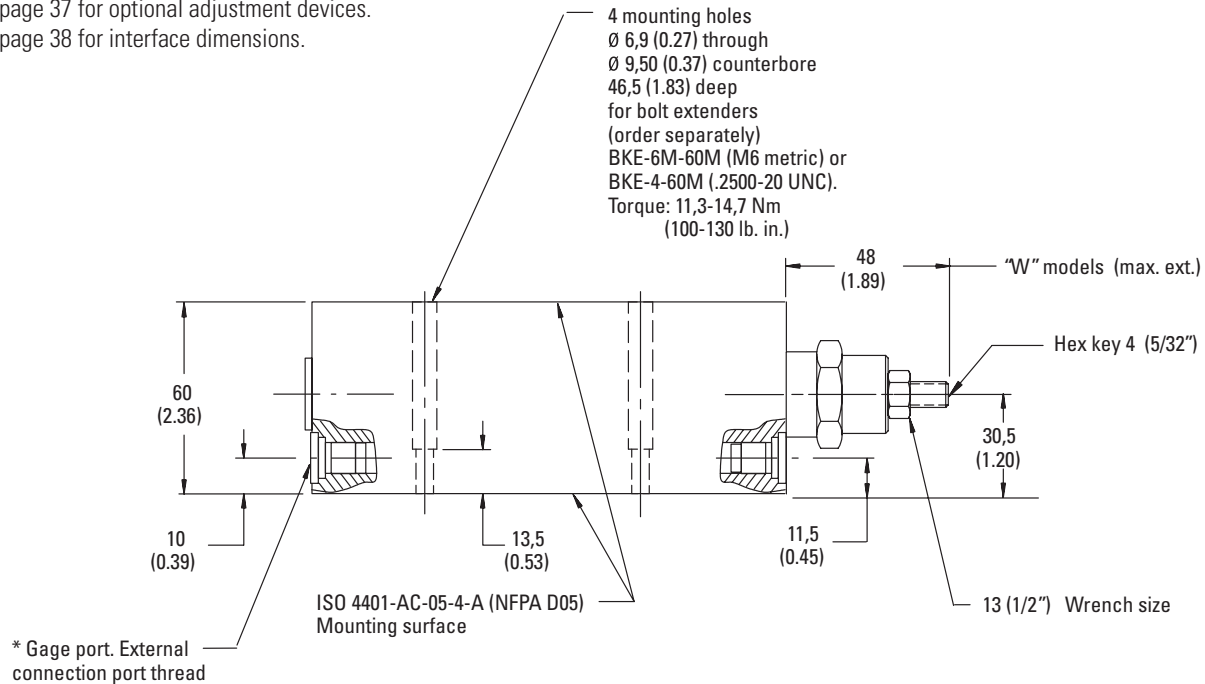
DGMR1-5-PP-**-30

Sequence Valve

mm (inches)

See page 37 for optional adjustment devices.

See page 38 for interface dimensions.



*External drain and gage port threads

"S" models - SAE-4 O-ring boss port
 (0.4375-20 UNF-2B thread).

"B" models - G 1/8 (1/8 BSPF)

Note: Back pressure in drain is added to this setting for internal drain models only.

SystemStak™ Counterbalance Valves

DGMR General Description

Eaton SystemStak counterbalance valves provide continuous protection from pump cavitation and prevent an actuator from running ahead of the pump supply.

These valves also provide thermal relief protection in closed systems.

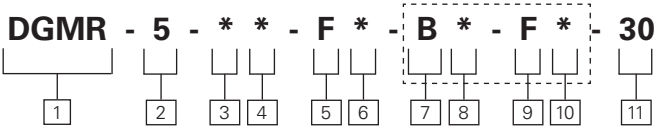
NOTE

Counterbalance valves adjust in the opposite direction of other pressure control valves. Turning the adjuster counterclockwise increases the valve setting. Turning the adjustment clockwise lowers the pressure setting, releasing the load.

Drain

Any pressure in the line to which these valves are drained is additive to the valve pressure setting.

Model Code



1 Valve function

Manifold or subplate mounted counterbalance valve.

2 Interface

5 – ISO 4401-AC-05-4-A, CETOP 5
RP35H, Size 5 ANSI/NFPA D05

3 Port operated upon

A – Counterbalance in A, piloted from B
B – Counterbalance in B, piloted from A

4 Pilot ratio

1 – 4:1
2 – 10:1

5 Pressure range

F – 60 to 210 bar (900 to 3000 psi)

6 Adjustment device

H – Knob adjuster
C – Cap over screw
W – Screw with locknut

7 Port acted upon

(Omit for single type.)
B – Counterbalance in B, piloted from A

8 Pilot ratio

(Omit for single type.)
1 – 4:1
2 – 10:1

9 Pressure range

(Omit for single type.)
F – 60 to 210 bar (900 to 3000 psi)

10 Adjustment device

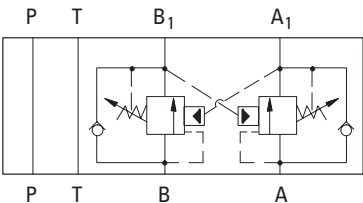
(Omit for single type.)
H – Knob adjuster
C – Cap over screw
W – Screw with locknut

11 Design number - 30 series

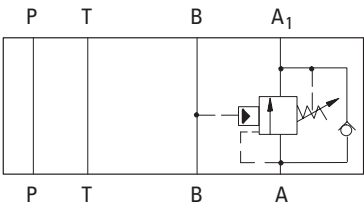
Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

Functional Symbols

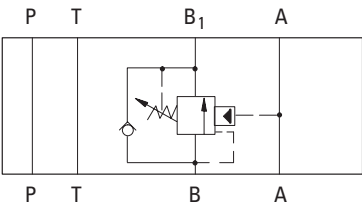
DGMR-5-A*-FW-B*-FW-30



DGMR-5-A*-FW-30



DGMR-5-B*-FW-30



Operating Data

Basic Characteristics

Maximum flow	120 l/min (32 USgpm)
Load holding leakage @70% of pressure setting	0.35 ml/min.
Cracking Pressure Adjustment Range	60-210 bar (900-3000 psi)
Pilot Ratios	4:1, 10:1
Maximum operating pressure	315 bar (4500 psi)
Leakage flow rate @ 50° C (120° F) and 315 bar (4500 psi)	5 drops/min, Port A to Port A _i at 70% of crack setting
Operating temperature	-40° to 80°C (-40° to 180°F)
Weights	4,5 kg (10 lbs)

Performance Data

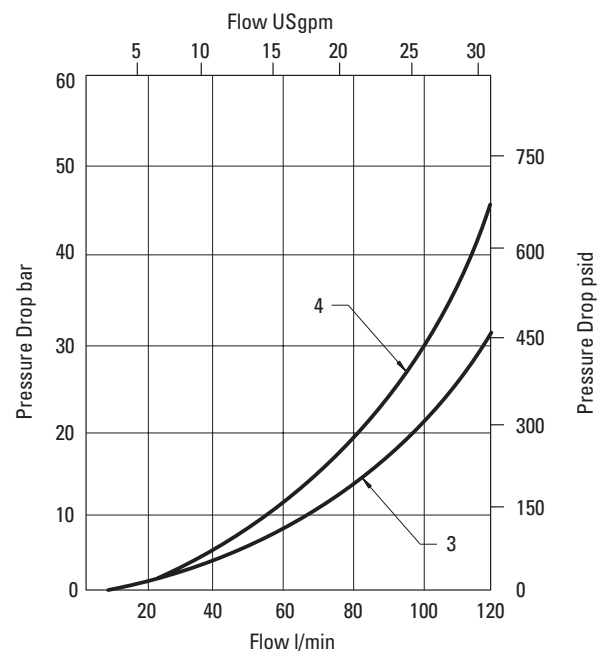
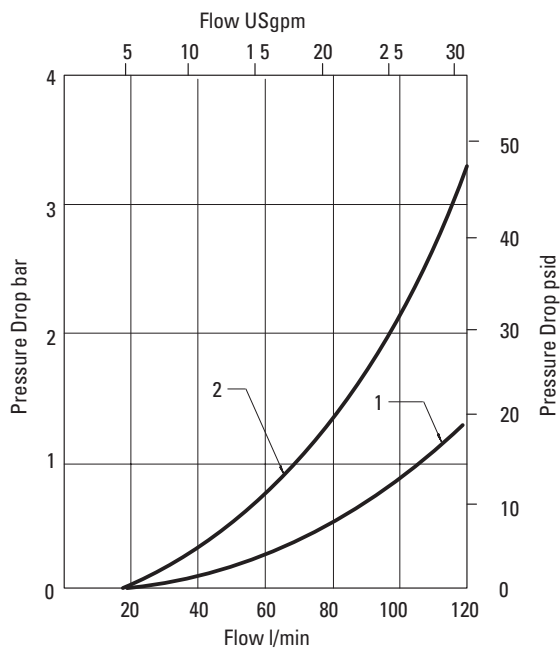
DGMR Performance Curves

Insertion Losses

These curves show the typical pressure drop for each flow path in the valve for fluid viscosity range 21-32 cSt (100-150 SSU).

The total insertion loss for the valve is calculated by summing the losses through each of the four flow paths.

1. "P" port for all models.
"A" port of DGMR-5-B*-30
"B" port of DGMR-5-A*-30
2. "T" port for all models.
3. Free flow through service port of counterbalance.
4. Piloted port open through service port of counterbalance.

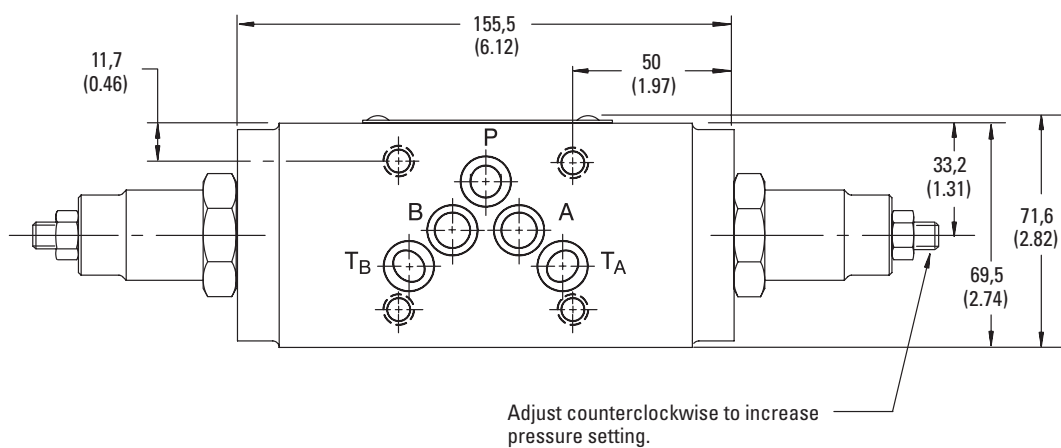
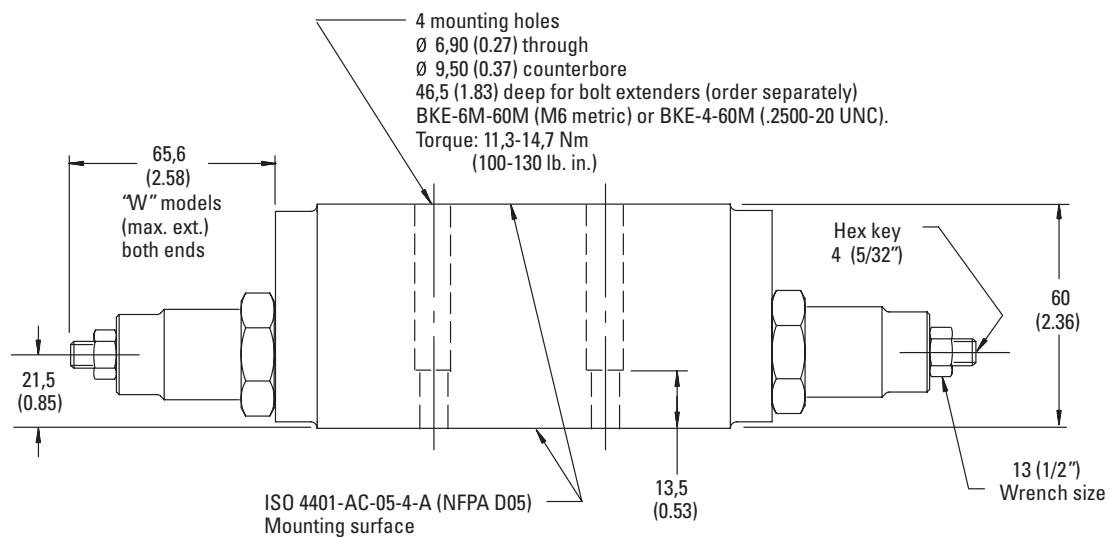


Installation Dimensions

DGMR-5-A*-FW-B*-FW-30 Dual Counterbalance on A & B Ports mm (inches)



See page 37 for optional adjustment devices.
See page 38 for interface dimensions.



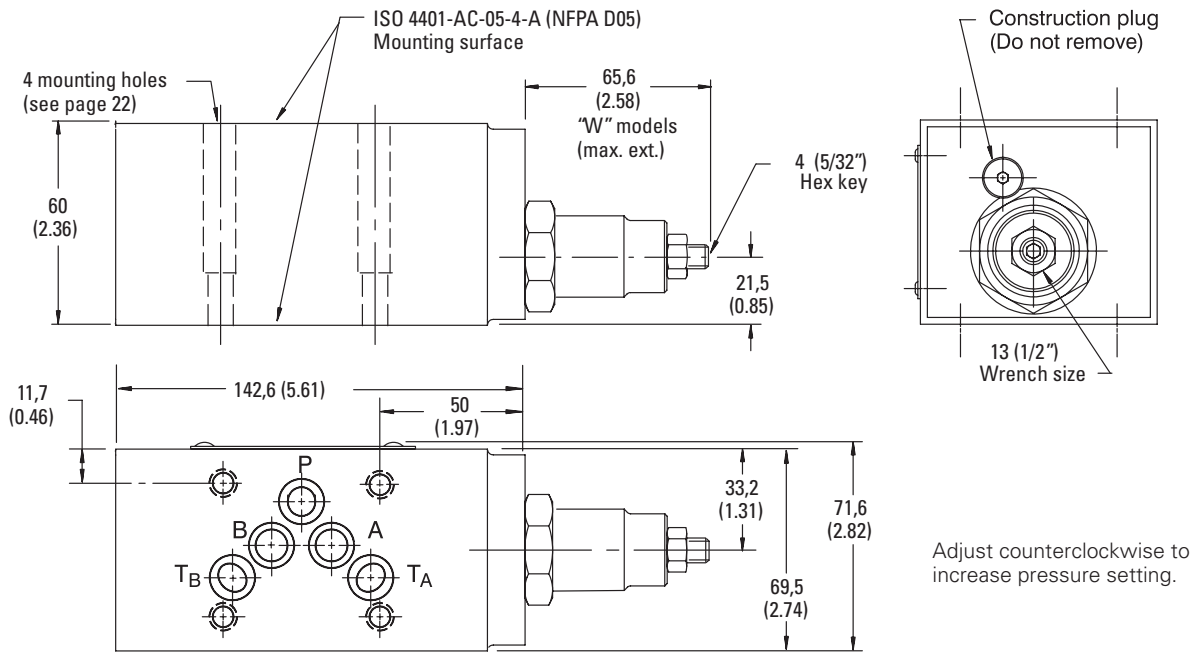
N

Installation Dimensions

DGMR-5-A*-FW-30

Counterbalance Port A, Piloted from B

mm (inches)

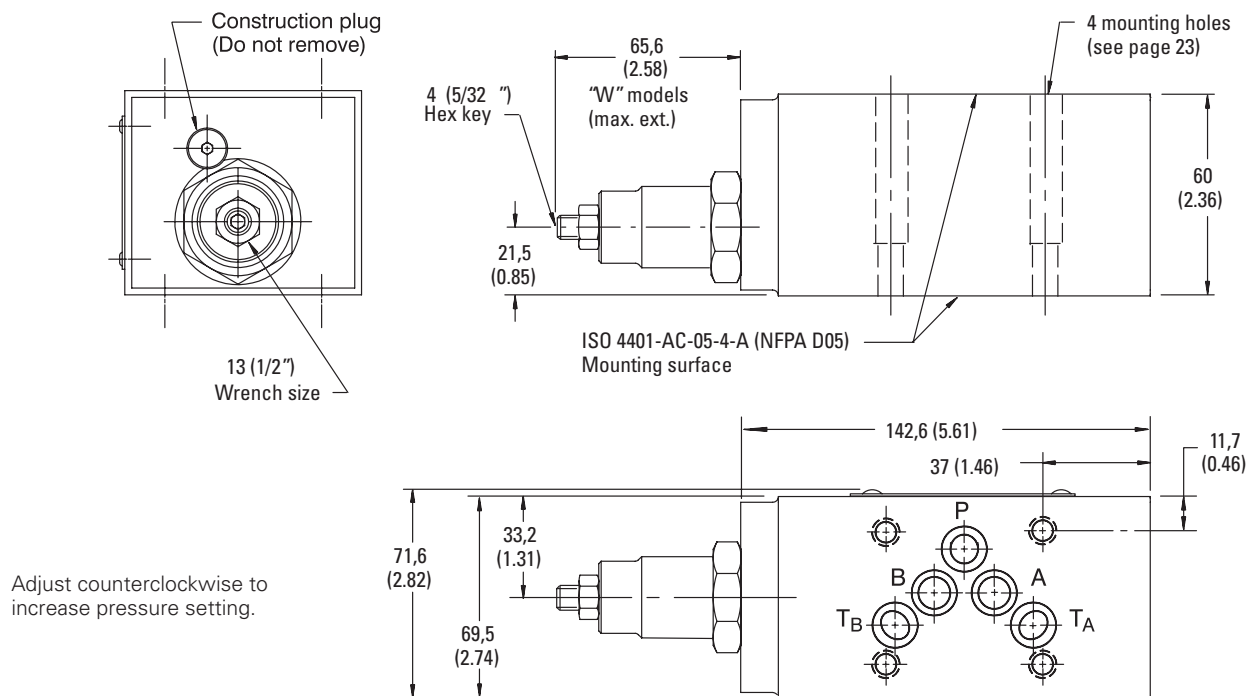


See page 37 for optional adjustment devices.

See page 38 for interface dimensions.

DGMR-5-B*-FW-30

Counterbalance Port B, Piloted from A



SystemStak™ Flow Control Valves

DGMFN General Description

These valves are adjustable, non-compensated flow restrictors. An integral check valve around the regulating orifice allows free flow in one direction and metered flow in the other.

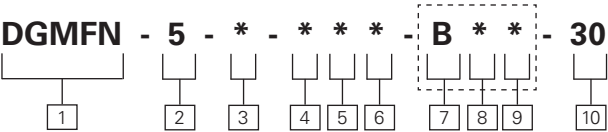
Control is available in “A” only, “B” only, and “A” and “B” ports as an “X” type (meter-in) or “Y” type (meter-out).

The “P” port is available only in the “X” type (meter-in) and does not contain a reverse flow check.

The valve flow setting is adjustable by means of either a hex key adjusting screw and locknut, a hand-adjust knob, or a micrometer knob with keylock.

A normal or fine metering capability is available. See the pressure drop curves on page 26 for detailed performance difference.

Model Code



1 Valve function

Manifold or subplate mounted flow control valve.

2 Interface

5 – ISO 4401-AC-05-4-A, CETOP 5 Size
5 RP35H ANSI/NFPA D05

3 Direction of flow

X – Meter-in
Y – Meter-out

4 Port operated upon

A – Cylinder port “A” (single or dual type)
B – Cylinder port “B” (single type only)
P – Pressure port (single type only)

5 Adjustment range

1 – Fine control
2 – Normal control

6 Adjustment device

H – Knob adjuster
K – Micrometer knob with keylock
W – Screw with locknut

7 Port operated upon: second function

(Omit for single flow control models.)
B – B cylinder port (Dual type)

8 Adjustment range: second function

(Omit for single flow control models.)
1 – Fine control
2 – Normal control

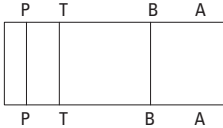
9 Adjustment device: second function

(Omit for single flow control models.)
H – Knob adjuster
K – Micrometer knob with keylock
W – Screw with locknut

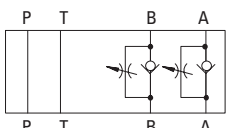
10 Design number - 30 series

Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

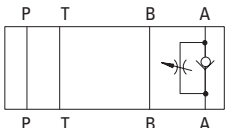
DGMFN-5-X-P**-30



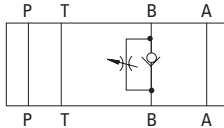
DGMFN-5-X-A**-B**-30



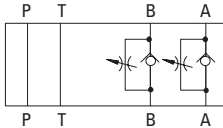
DGMFN-5-X-A**-30



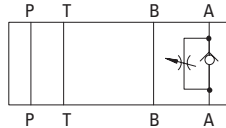
DGMFN-5-X-B**-30



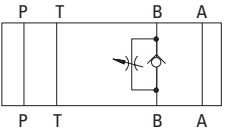
DGMFN-5-Y-A**-B**-30



DGMFN-5-Y-A**-30



DGMFN-5-Y-B**-30



Operating Data

Basic Characteristics

Maximum flow	120 l/min (32 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Operating temperature	20° to 50°C (70° to 120°F)
Weights	3,1 kg (7 lbs)

Performance Data

Minimum Controlled Flow/No-Flow Leakage

Internal leakage will vary from valve to valve and with the pressure differential across the check. Approximate levels are:

Pressure Drop bar (psi)	Leakage* cc/min (in3/min)
50 (725)	160 (9.5)
100 (1450)	320 (19)
200 (2900)	640 (38)
315 (4500)	990 (60)

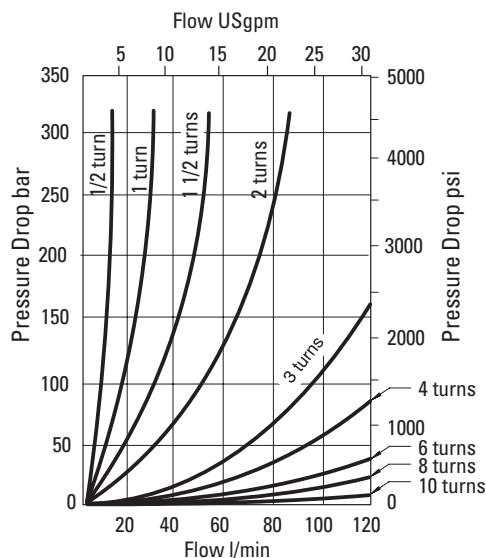
* Equals minimum controllable flow rate at the pressures stated.

Pressure Drop

The curves below show the pressure drop through individual flow passages. Curves labeled "metered flow/pressure drop" refer to the pressure drop through only the passage containing the flow control regulating orifice. Total valve insertion loss is a value derived from graph 1 or 2 plus the appropriate values of lines 1, 2 and 3 from graph 3.

Graph 1

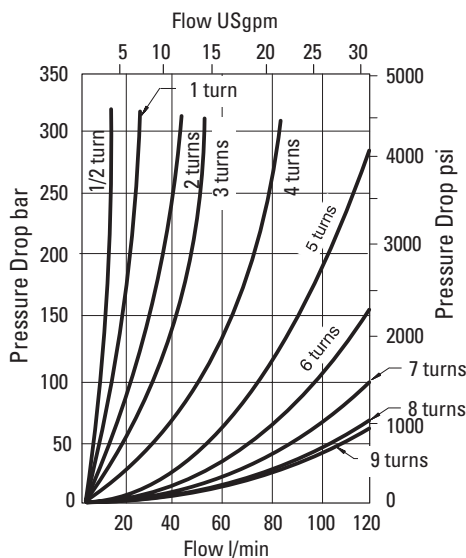
Metered flow pressure drop.
Normal adjustment – "2"
models (see model code,
page 24).



Note: "Turn" or "Turns" on curves in graphs 1 and 2, above, refer to turn of adjustment device from fully closed position.

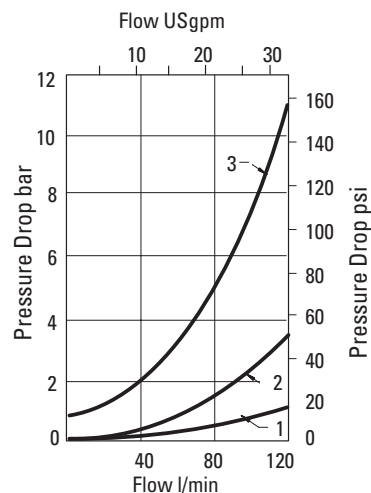
Graph 2

Metered flow pressure drop.
Fine adjustment – "1" models
(see model code, page 24).



Graph 3

Free flow pressure drop across
check valve.



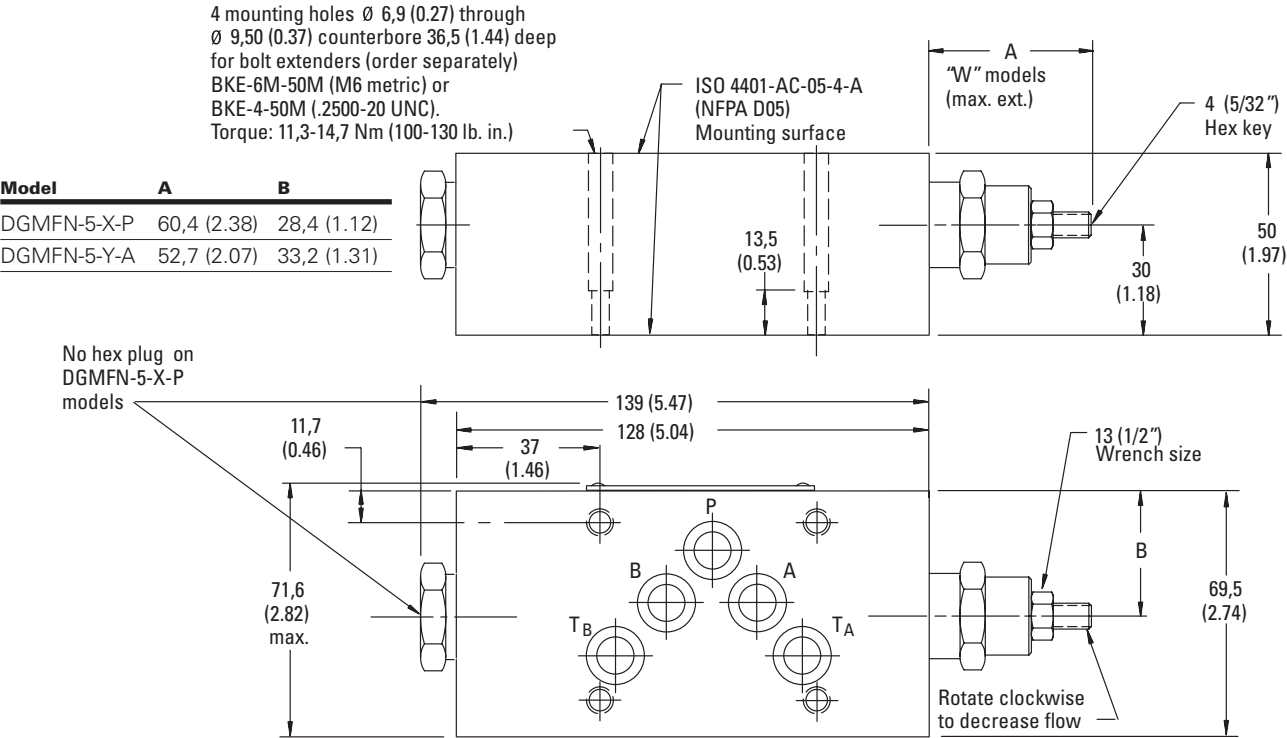
Graph 3

- 1 – "P" port of all models except DGMFN-5-X-P*-30
"B" and "T" ports of DGMFN-5-X-P*-30
- 2 – "T" port of all models except DGMFN-5-X-P*-30
"A" ports of DGMFN-5-X-P*-30
- 3 – Pressure drop across reverse free flow check valve

Installation Dimensions

DGMFN-5-X-P & DGMFN-5-Y-A Single Flow Controls

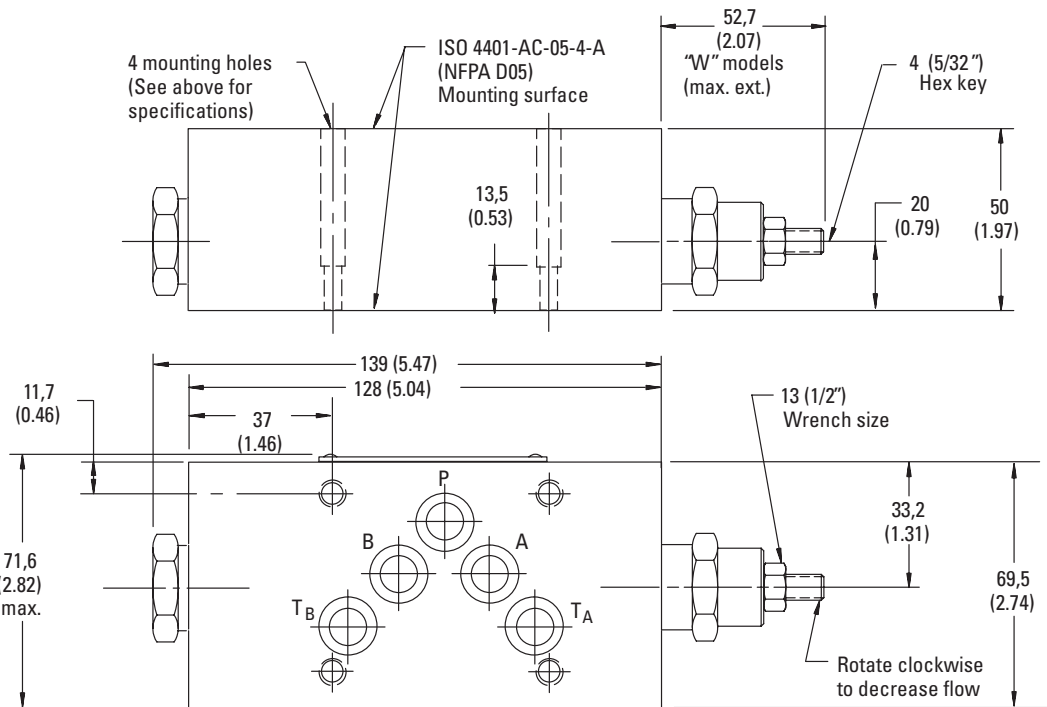
mm (inches)



See page 37 for optional adjustment devices.
See page 38 for interface dimensions.

DGMFN-5-X-A Single Flow Control

mm (inches)

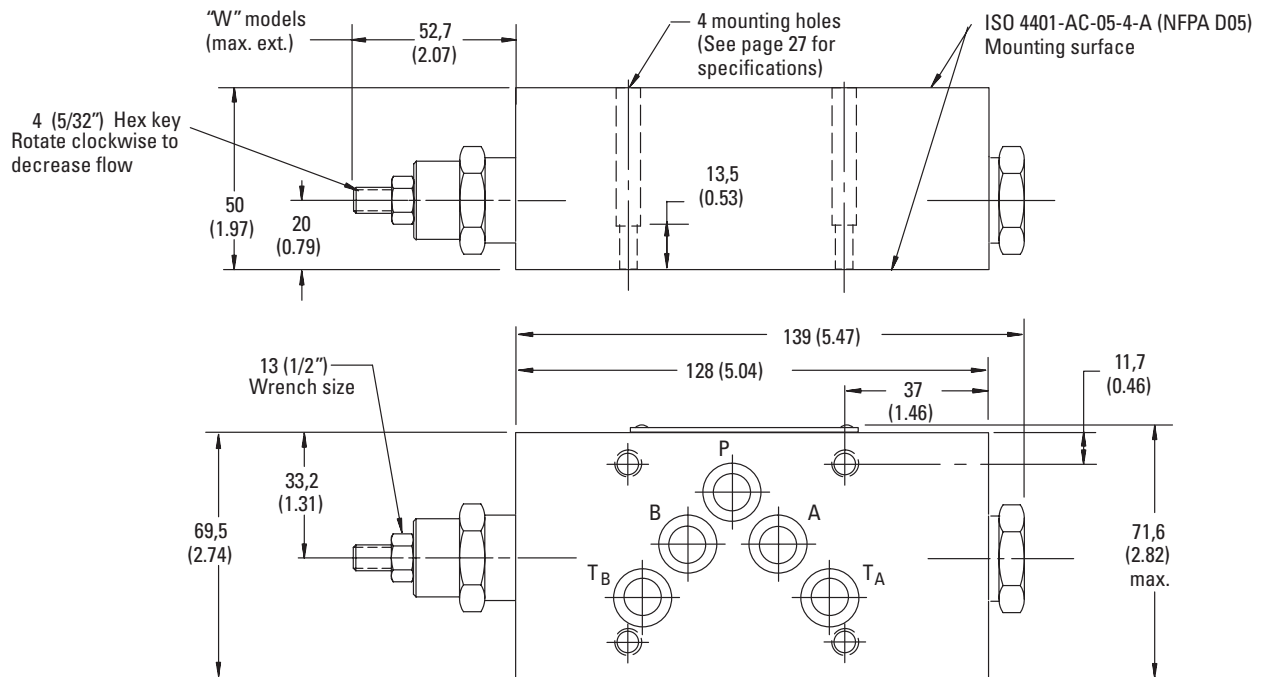


Installation Dimensions

DGMFN-5-X-B

Single Flow Control

mm (inches)

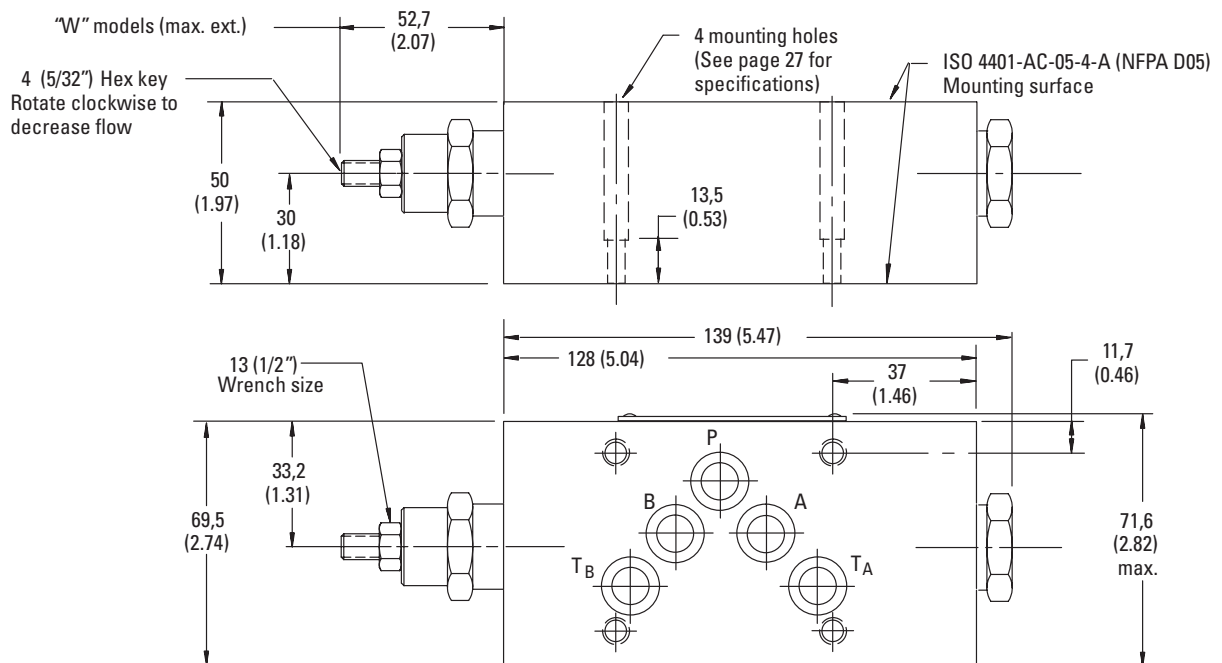


See page 37 for optional adjustment devices.

See page 38 for interface dimensions.

DGMFN-5-Y-B

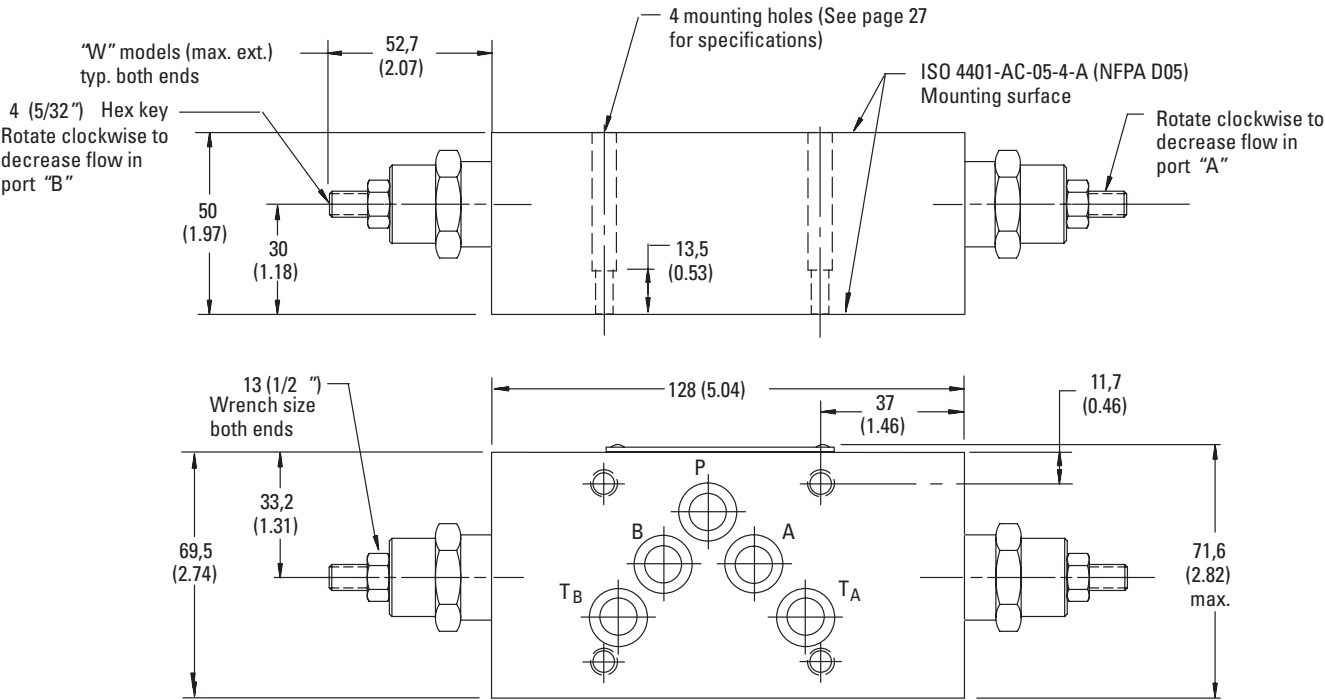
Single Flow Control



Installation Dimensions

DGMFN-5-Y Dual Flow Control

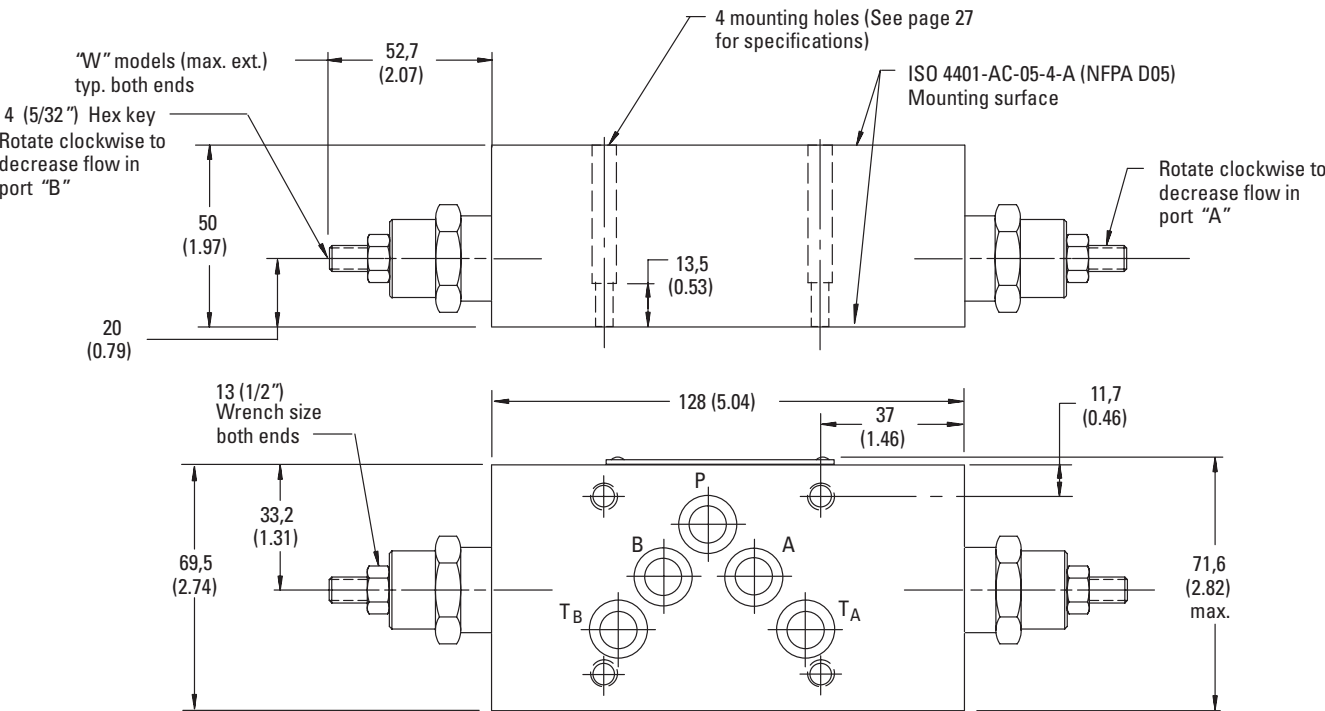
mm (inches)



See page 37 for optional adjustment devices.
See page 38 for interface dimensions.

DGMFN-5-X Dual Flow Control

mm (inches)



SystemStak™ Pilot Operated Check Valves

DGMPC

General Description

These valves are single or dual check units. Dual check units have identical check elements located in the “A” and “B” cylinder port lines. The check valve poppets are moved into the open position by a central pilot control spool which moves toward one check or the other, depending on which port is pressurized.

The check valve located in the return circuit is opened by the operating pressure in the primary circuit. When the pressure in the pilot line is vented, the check valve will remain closed.

The pilot spool area to valve seat ratio is 3:1 on standard models, and 20:1 on models with the decompression feature.

Check valve cracking (opening) pressures of 1 bar (15 psi), 2,5 bar (36 psi) and 5 bar (73 psi) are available. Please note that back pressure on the downstream or free-flow side of the pilot check valve may prevent the valve from opening in certain situations. (Back pressure opposes pilot pressure trying to open the valve.) In such cases, pilot pressure required to open the decompression poppet and valve can be calculated as follows:

To open valve or poppet in line A:

$$\text{Pressure at } B_1 = \frac{P_A + P_C - P_{A1}}{\text{Area ratio factor}} + P_{A1}$$

To open valve or poppet in line B:

$$\text{Pressure at } A_1 = \frac{P_B + P_C - P_{B1}}{\text{Area ratio factor}} + P_{B1}$$

Where:

P_A = Pressure at A

P_C = Cracking pressure

P_{A1} = Pressure at A1

P_B = Pressure at B

P_{B1} = Pressure at B1

In the above cases, substitute cracking pressure and area ratio from the following:

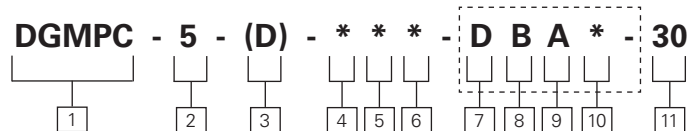
Cracking pressure: 1, 2.5 or 5 bar according to model code position 6 (and position 10 for second function).

Area ratio factors:

Standard valve: 3

Decompression poppet: 20

Model Code



1 Valve function

Manifold or subplate mounted check valve.

2 Interface

5 – ISO 4401-AC-05-4-A, CETOP RP35H, Size 5 ANSI/NFPA D05

3 Decompression feature

D – With decompression feature
Blank – Standard (no decompression)

4 Check port

A – Check in cylinder port “A”
B – Check in cylinder port “B”
(single check models only)

5 Pilot port

A – Pilot port controlling the “B” port check (single check models only)
B – Pilot port controlling the “A” port check

6 Cracking pressure

K – 1,0 bar (15 psi)
M – 2,5 bar (35 psi)
N – 5,0 bar (75 psi)

7 Decompression feature

D – Decompression feature
Blank – Standard (no decompression)
Omit for single check models.

8 Check port: second function

B – Check in cylinder port “B”
Omit for single check models.

9 Pilot port: second function

A – Pilot port controlling the “B” port check (dual check models only)
Omit for single check models.

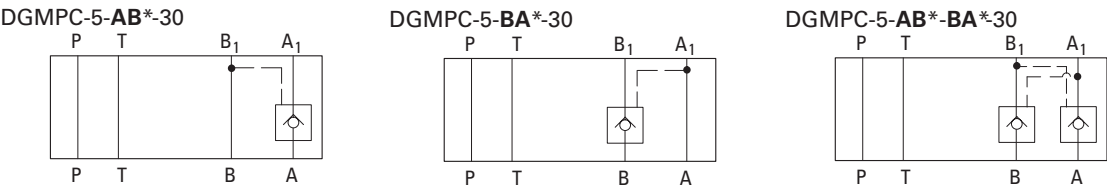
10 Cracking pressure: second function

K – 1,0 bar (15 psi)
M – 2,5 bar (35 psi)
N – 5,0 bar (75 psi)
Omit for single check models.

11 Design number - 30 series

Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

Functional Symbols



Operating Data

Basic Characteristics	
Maximum flow	120 l/min (32 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Leakage @ 50°C (120°F) Poppet @ 35 bar (500 psi)	
Standard models	0.3 ml/min.
"D" models	1.0 ml/min.
Piston @315 bar (4500 psi)	20°C to 50°C (70 to 120°F)
Operating temperature	20°C to 50°C (70° to 120°F)
Weights	2,9 kg (6.4 lbs)

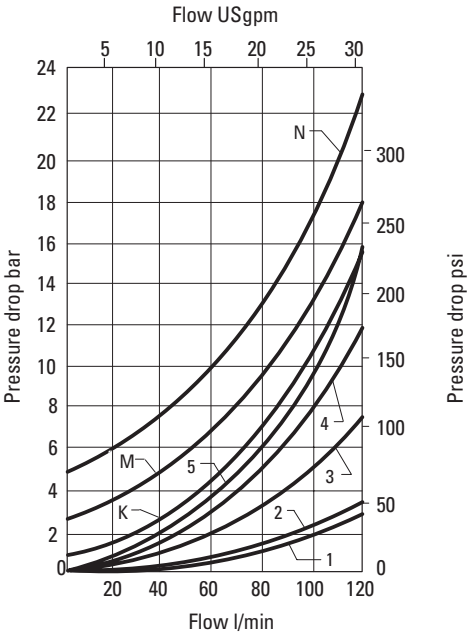
Performance Data

DGMPC Pressure Drop

The curves below show pressure drop through each functional flow path in the valve. The total insertion loss for the valve must be calculated by summing the losses through the four applicable flow paths.

Model Type	Curve Number							
	P	T	A			B		
DGMPC-5-(D)-AB*-30	1	2	-	5	▲	● 3 ■ 4	-	-
DGMPC-5-(D)-BA*-30	1	2	● 3 ■ 4	-	-	-	5	▲
DGMPC-5-(D)-AB*-(D)-BA*-30	1	2	-	5	▲	-	5	▲

- Flow toward actuator without check – single check only
- Flow from actuator without check – single check only
- ▲ Use K, M, or N cracking pressure curve as applicable



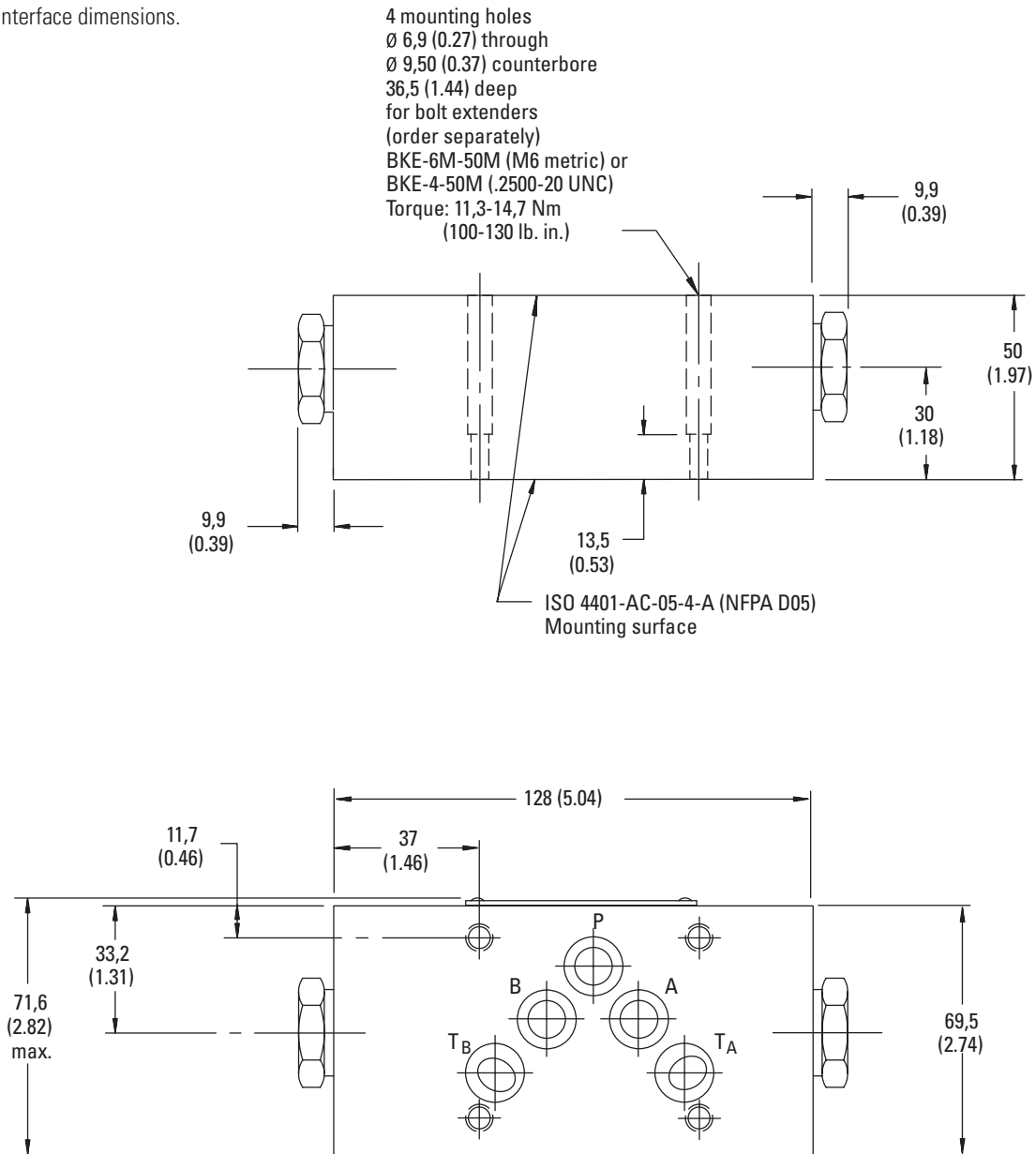
Installation Dimensions

DGMPC-5-30

Pilot Operated Check Valve

mm (inches)

See page 38 for interface dimensions.



SystemStak™ Direct Check Valves

DGMDC General Description

These SystemStak valves are self-operating, spring loaded, poppet type single or dual check units.

Location of the check element can be in the “A”, “B”, “P” or “T” port.

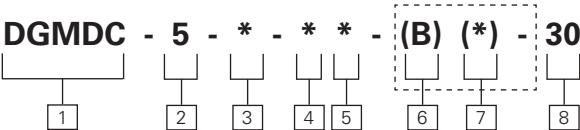
A check in the “P” port is available as a “Y” single check model only.

A check in the “T” port is available as an “X” single check model only.

The dual check unit has identical check elements in both the “A” and “B” ports.

Check valve cracking (opening) pressures of 1 bar (15 psi), 2,5 bar (35 psi) and 5 bar (75 psi) are available.

Model Code



1 Valve function

Manifold or subplate mounted check valve.

2 Interface

5 – ISO 4401-AC-05-4-A, CETOP RP35H, Size 5 ANSI/NFPA D05

3 Direction of flow

X – Free flow from actuator (load)
Y – Free flow to actuator (load)

4 Check location

A – Check in cylinder port “A”
 (“Y” models only)
B – Check in cylinder port “B”
 (“Y” models only)
P – Check in pressure port “P”
 (“Y” models only)
T – Check in tank port “TA”
 (“X” models only)

5 Cracking pressure

K – 1,0 bar (15 psi)
M – 2,5 bar (35 psi)
N – 5,0 bar (75 psi)

6 Check location: second function

Omit for single check models.
B – Check in cylinder port “B”
 (dual check models only)

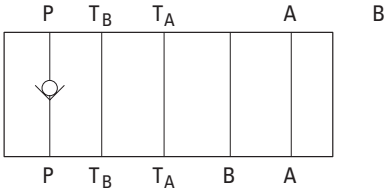
7 Cracking pressure: second function

Omit for single check models.
K – 1,0 bar (15 psi)
M – 2,5 bar (35 psi)
N – 5,0 bar (75 psi)

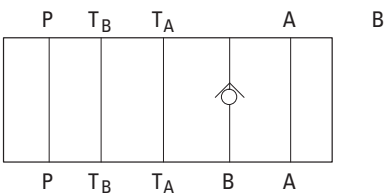
8 Design number - 30 series

Subject to change. Installation dimensions unaltered for design numbers 30 to 39 inclusive.

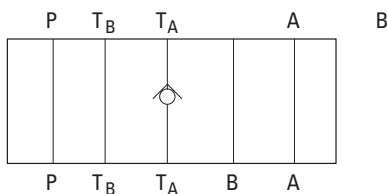
DGMDC-5-Y-P*30



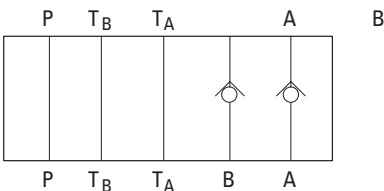
DGMDC-5-Y-B*30



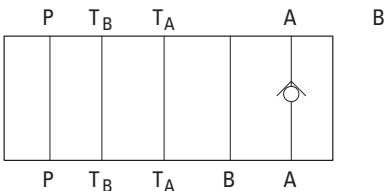
DGMDC-5-X-T*30



DGMDC-5-Y-A*-B*30



DGMDC-5-Y-A*30



Operating Data

Basic Characteristics	
Maximum flow	120 l/min (32 USgpm)
Maximum operating pressure	315 bar (4500 psi)
Leakage @ 50°C (120°F) Poppet @ 35 bar (500 psi)	0.3 ml/min.
Operating temperature	20°C to 50°C (70° to 120°F)
Weights	2,9 kg (6.4 lbs)

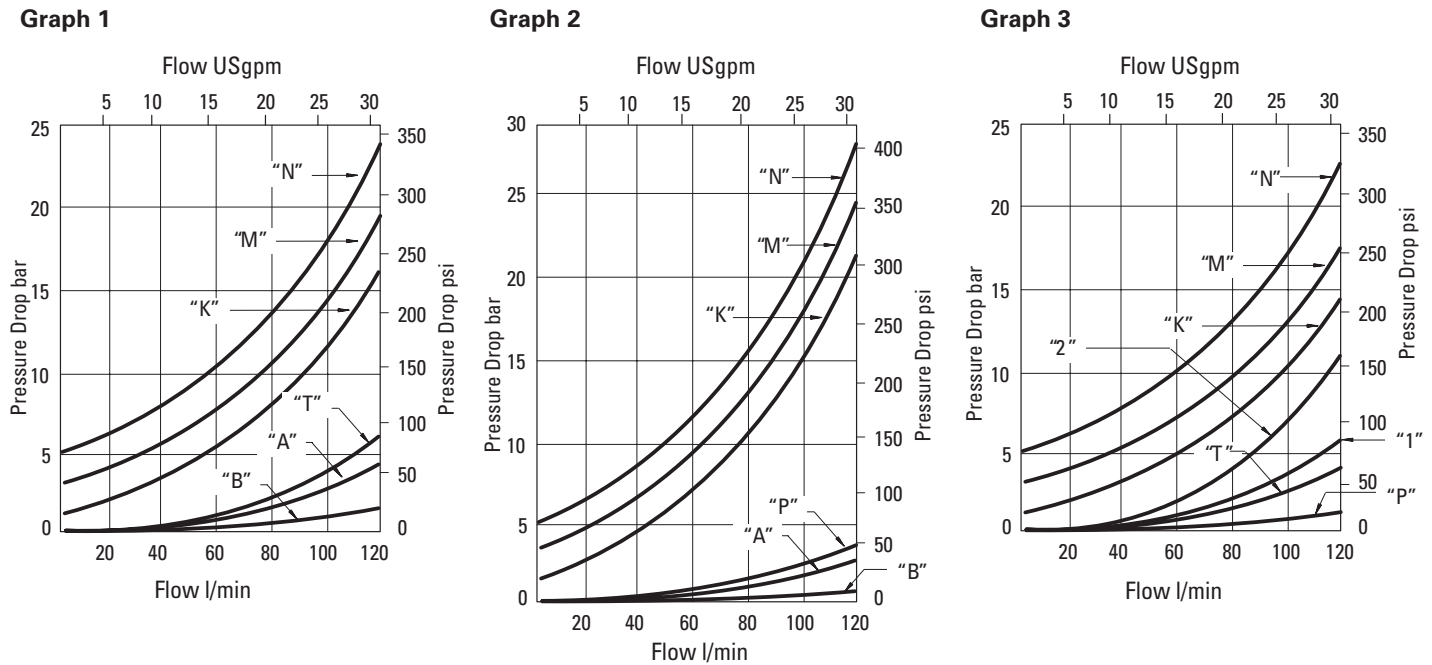
Performance Data

Pressure Drop

These curves show pressure drop though each possible flow path in the valve. The total insertion loss for the valve must be calculated by summing the losses through the four applicable flow paths.

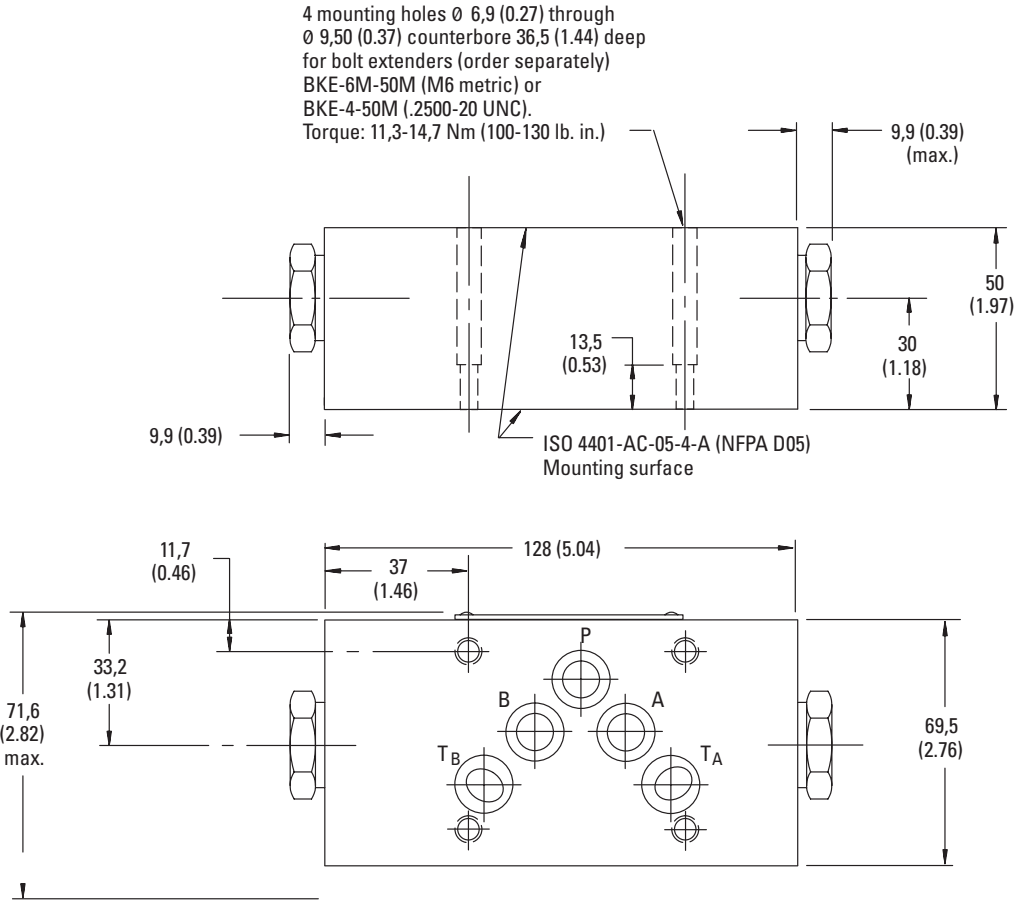
Model Type	Curve Reference for Flow Path				Graph Number
	P	T	A	B	
DGMDC-5-Y-PK-30	K				1
DGMDC-5-Y-PM-30	M	T	A	B	
DGMDC-5-Y-PN-30	N				
DGMDC-5-X-TK-30		K			2
DGMDC-5-X-TM-30	P	M	A	B	
DGMDC-5-X-TN-30		N			
DGMDC-5-Y-AK-30			K	•1	3
DGMDC-5-Y-AM-30	P	T	M	■2	
DGMDC-5-Y-AN-30			N		
DGMDC-5-Y-BK-30			•1	K	
DGMDC-5-Y-BM-30	P	T		M	
DGMDC-5-Y-BN-30			■2	N	
DGMDC-5-Y-A*-B*-30	P	T	▲	▲	

- Flow to actuator through cylinder port without check
- Flow from actuator through cylinder port without check
- ▲ Use K, M, or N curve from graph 3, as applicable



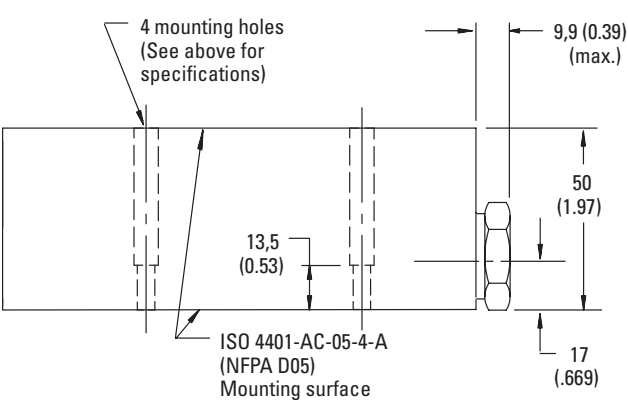
Installation Dimensions

DGMDC-5-Y-A*-B*-30
Dual Direct Check Valve
mm (inches)

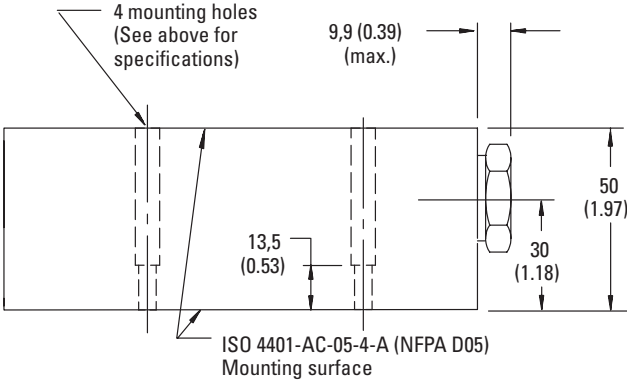


See page 38 for interface dimensions.

DGMDC-5-Y-P*-30
Single Direct Check Valve

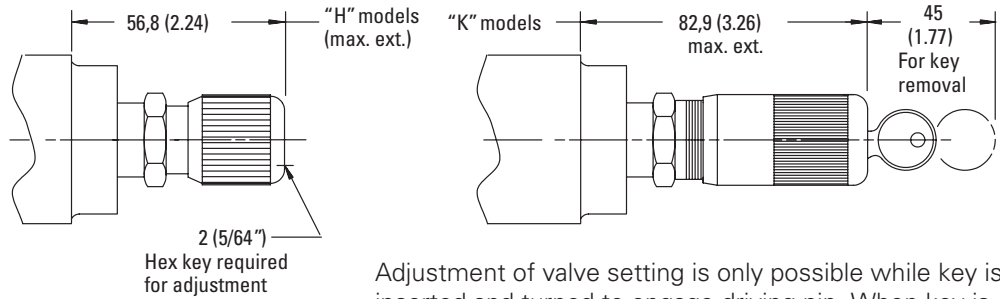


DGMDC-5-X-T*-30
Single Direct Check Valve



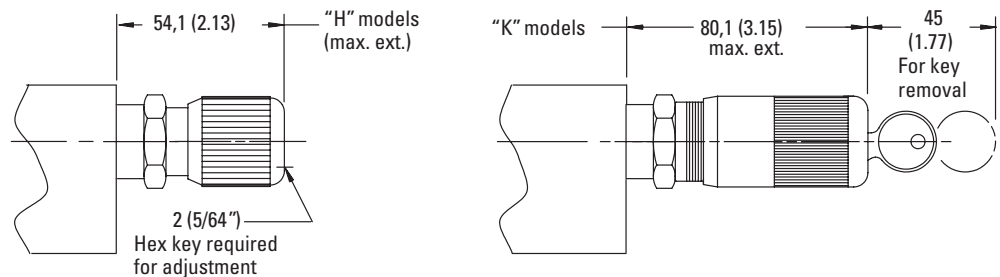
Knob Adjusters

DGMC DGMC2 (dual type) DGMR1 DGMX2



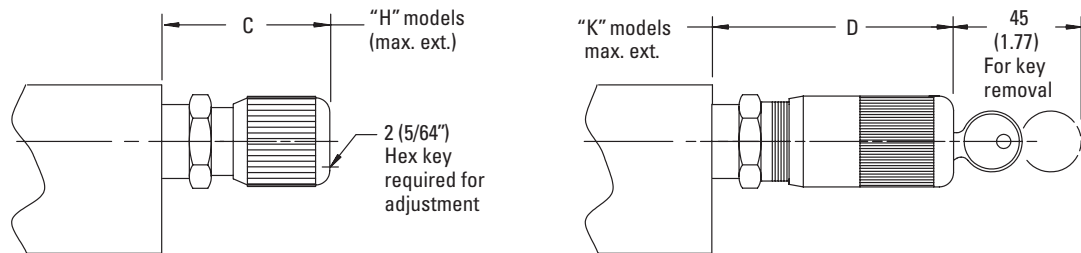
Adjustment of valve setting is only possible while key is inserted and turned to engage driving pin. When key is removed, adjuster knob can be freely spun and does not engage with setting mechanism.

DGMC2 (crossport type)



Adjustment of valve setting is only possible while key is inserted and turned to engage driving pin. When key is removed, adjuster knob can be freely spun and does not engage with setting mechanism.

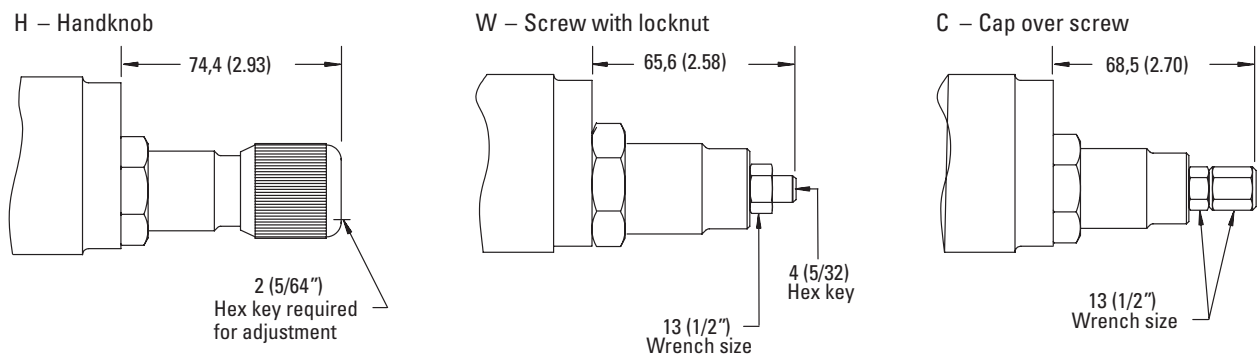
DGMFN



Model	C	D
DGMFN-5-X-P	68,9 (2.37)	95 (3.74)
DGMFN-5-Y-A	61,9 (2.44)	88 (3.46)

Adjustment of valve setting is only possible while key is inserted and turned to engage driving pin. When key is removed, adjuster knob can be freely spun and does not engage with setting mechanism.

DGMR



Bolt Extender Kits

ISO 4401-05 SystemStak valves may be mounted with either standard cap screws or bolt extender kits.

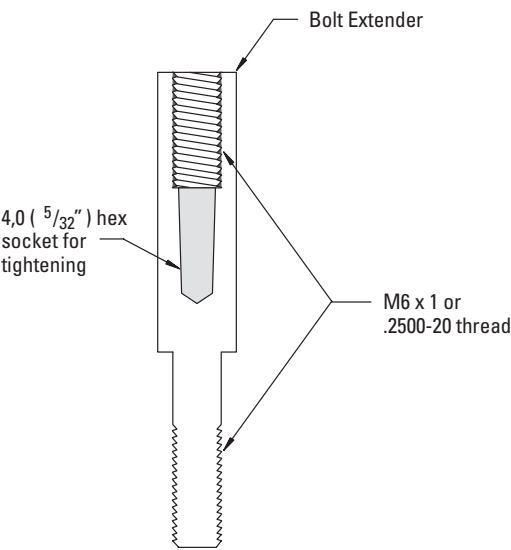
Metric cap screws must be of Class 12,9 (ISO 898) strength, minimum U.T.S. = 1200 MPa.

Inch threaded screws must conform to ANSI B18.3.

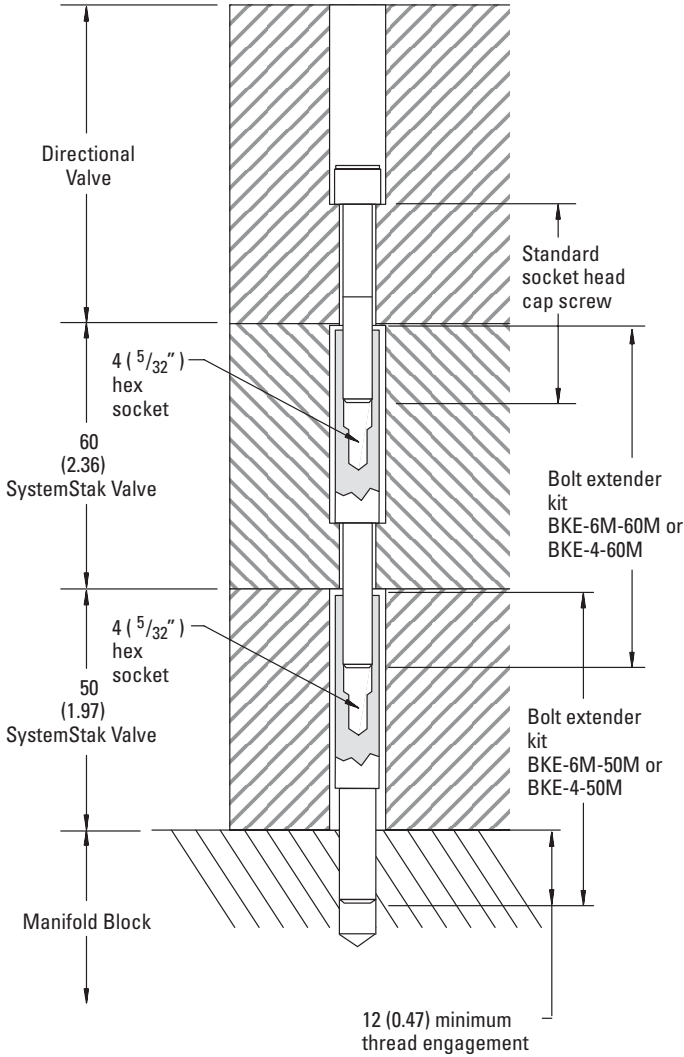
The use of Eaton bolt extenders simplifies installation by permitting each valve body to be separately installed with the correct torque value. A major advantage of bolt extenders is the ability to remove the directional valve for service or replacement without disturbing the stack assembly. There are 4 bolt extenders per kit.

SystemStak Valve Height		Metric		Inch		Extender Torque	
mm (inch)		Thread	Kit Model Number	Thread	Kit Model Number		
50 (1.97)		M6 x 1-6H	BKE-6M-50M	.2500-20 UNC	BKE-4-50M	11,3-14,7 Nm (100-130 lbf in)	
60 (2.36)		M6 x 1-6H	BKE-6M-60M	.2500-20 UNC	BKE-4-60M		

Bolt extender cross section



Example of bolt extenders on a typical SystemStak assembly

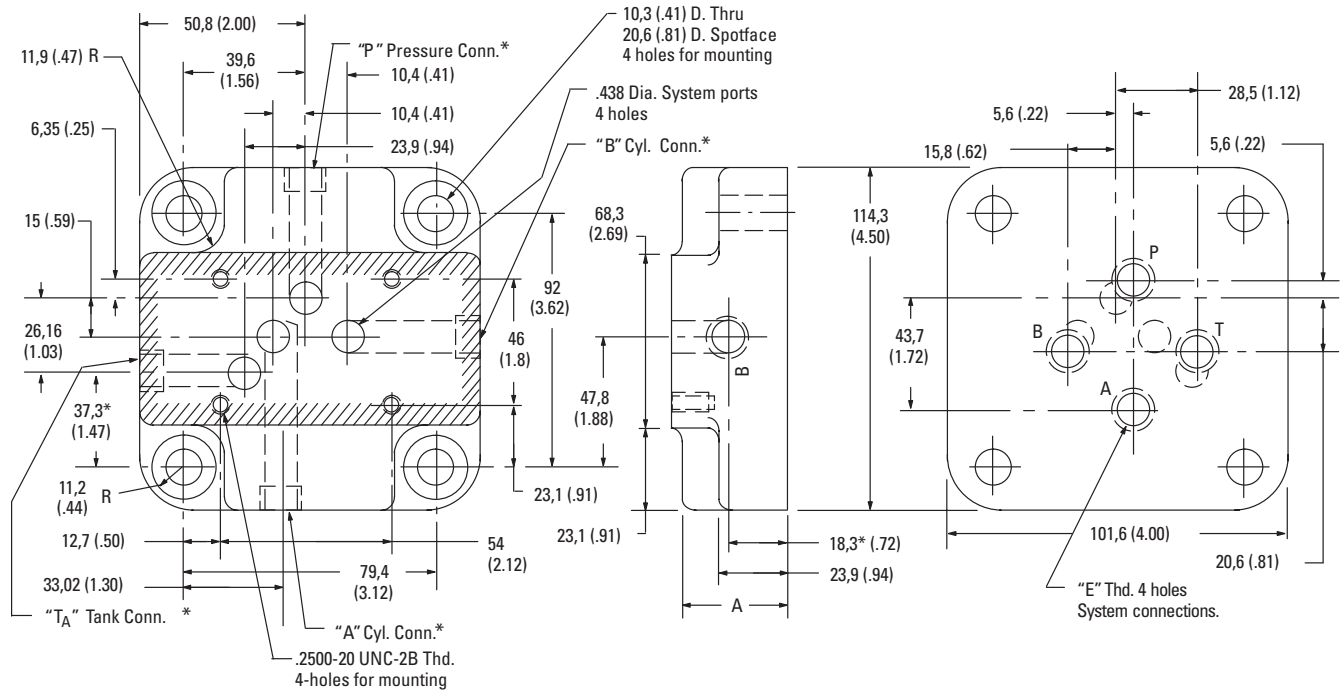


Subplates & Blanking Plate

Valves, subplates and blanking plates must be ordered separately.

DGSM(E) Subplate (rated at 210 bar (3000 psi))

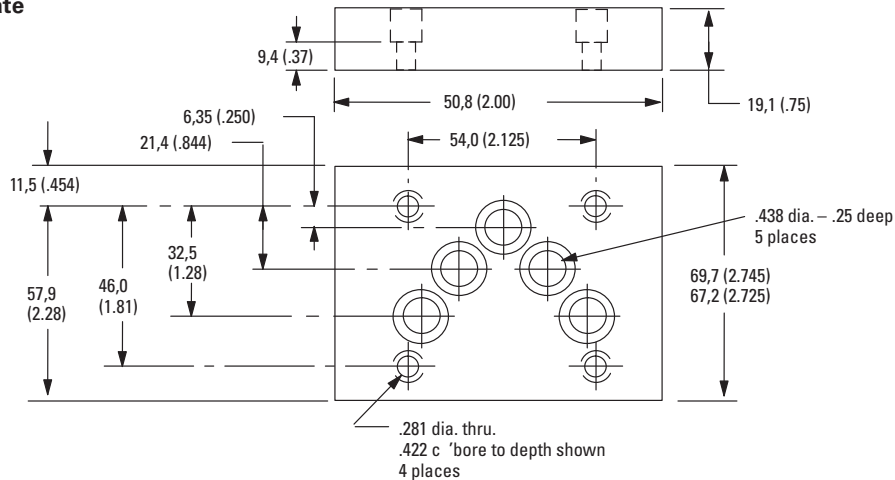
Millimeters (inches)



Model Numbers	"E" Thread	Tube Size	Dimension "A"
DGSM-01-20-T8	.750-16 UNF-2B	½" O.D.	31,75 (1.25)
DGSME-01-20-T8	.750-16 UNF-2B	½" O.D.	38,10 (1.50)

* Ports on side-connection Model DGSME-01-20-T8 only.

DGMAB-5-30 Blanking Plate

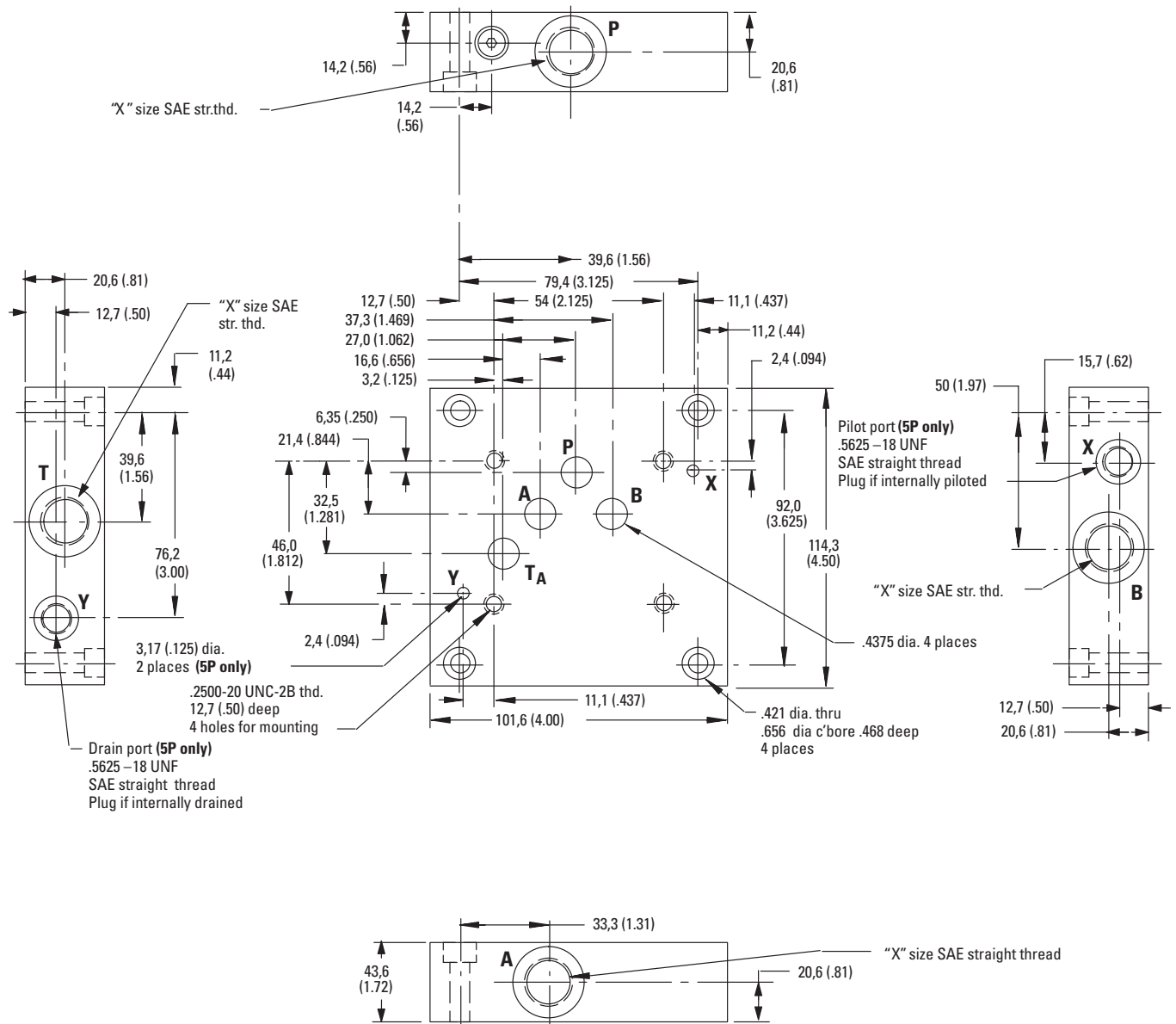


Subplates & Blanking Plates

DGVME Side Ported Subplates (rated at 315 bar (4500 psi)) "5" interface

Model	"X"	Assembly
DGVME-5-SP-10-T06	.5625	525815
DGVME-5-SP-10-T08	.7500	525816
DGVME-5-SP-10-T10	.8750	525817
DGVME-5-SP-10-T12	1.0625	525818
DGVME-5-SP-PD-10-T10†	.8750	526003
DGVME-5-SP-PD-10-T12†	1.0625	526004

† Model with pilot and drain ports.

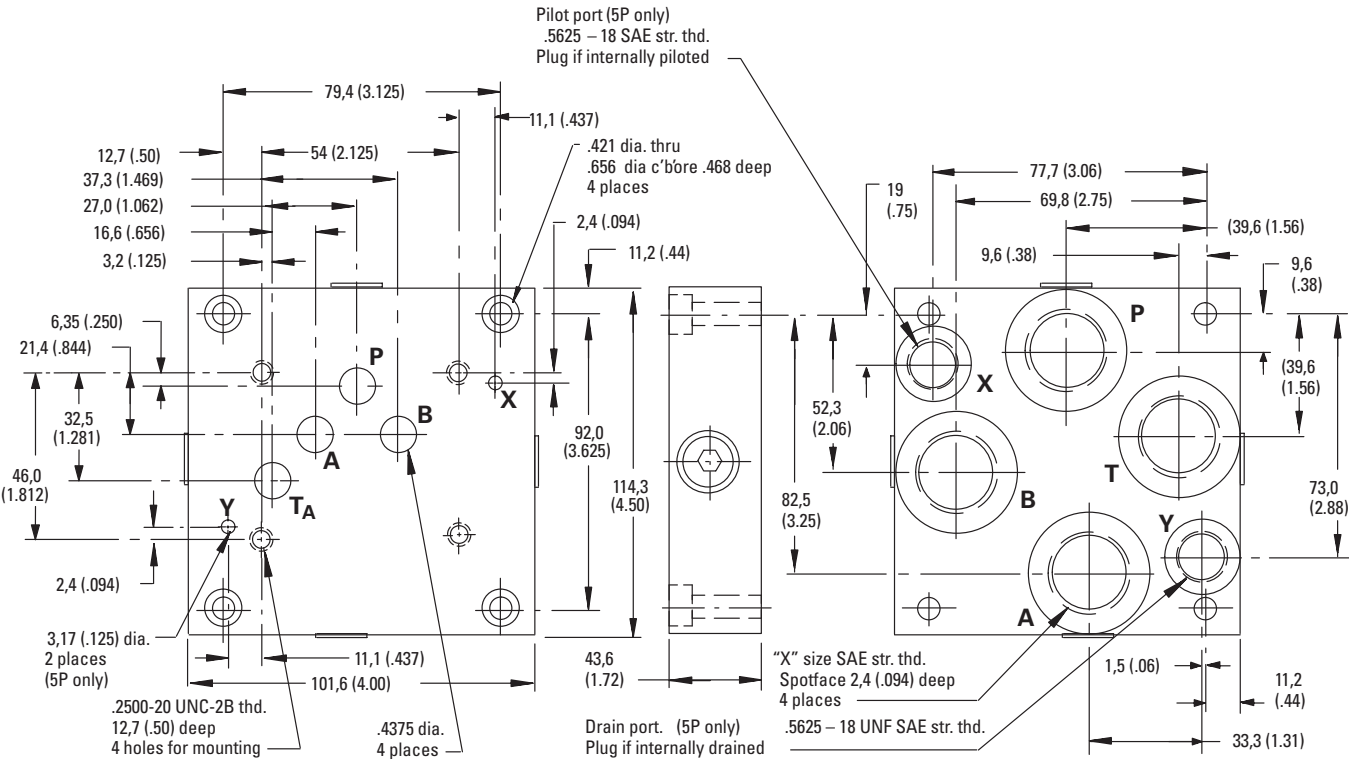


Subplates & Blanking Plates

DGVM Bottom Ported Subplates
(rated at 315 bar (4500 psi))
"5" interface

Model	"X"	Assembly
DGVM-5-SP-10-T06	.5625	525811
DGVM-5-SP-10-T08	.7500	525812
DGVM-5-SP-10-T10	.8750	525813
DGVM-5-SP-10-T12	1.0625	525814
DGVM-5-SP-PD-10-T10†	.8750	525832
DGVM-5-SP-PD-10-T12†	1.0625	525833

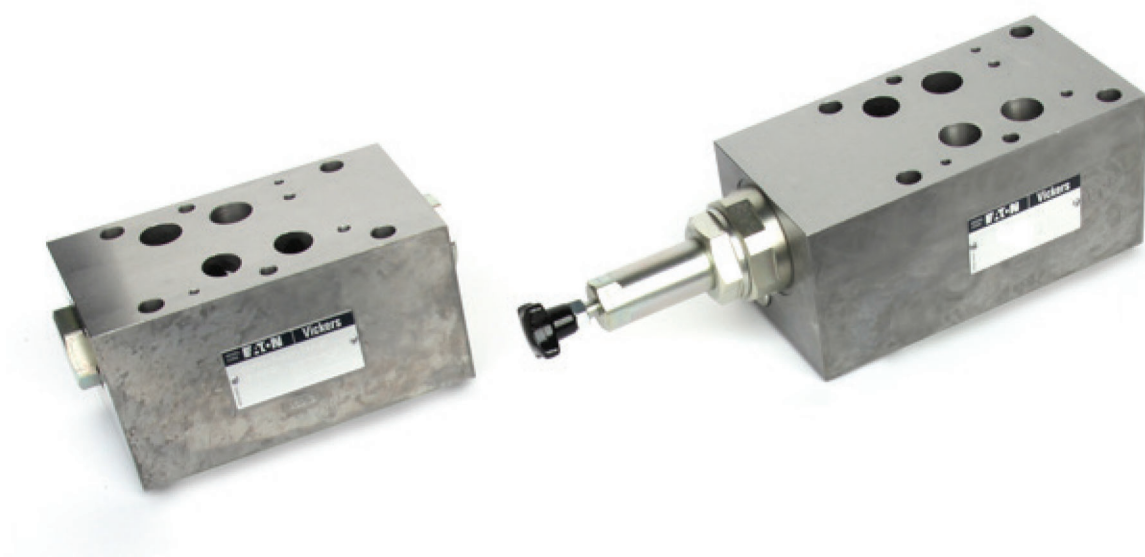
† Model with pilot and drain ports.



Eaton
Hydraulics Group USA
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952-937-9800
Fax: 952-294-7722
www.eaton.com/hydraulics

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Eaton
Hydraulics Group Asia Pacific
Eaton Building
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Changning District
Shanghai 200335
China
Tel: (+86 21) 5200 0099
Fax: (+86 21) 2230 7240



SystemStak™ Valves

ISO 4401 size 07; 315 bar (4500 psi); up to 200 L/min (53 USgpm)

General Description

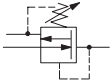
This range of stackable hydraulic controls are designed to be mounted under a size 7 directional valve such as Eaton DG*V-7, solenoid controlled and pilot operated. With their cartridge design they will provide a compact hydraulic circuit at reduced cost with the elimination of interconnecting piping. Servicing is simplified with access to working parts achieved without removing valves from an assembled stack.

The units are performance rated up to: 200 L/min (53 USgpm) 315/350 bar (4500/5000 psi)

The range comprises:

- DGMX-7Pressure reducing module
- DGMC-7 Pressure relief module
- DGMFN-7 Flow restrictor module
- DGMPC-7 Pilot operated check module

Table of Contents

Function	Basic symbol	Basic model	Features	Page
Reducing		DGMX	Piloted from (and reduced pressure in) port P, A or B	3
Relief		DGMC	Single, dual and crossport models	5
Pilot operated check		DGMPC	Single in port A or B; dual in ports A and B	7
Flow restrictor		DGMFN	Single or dual port, meter-in or meter-out	10

SystemStak™ Pressure Reducing Valve Modules

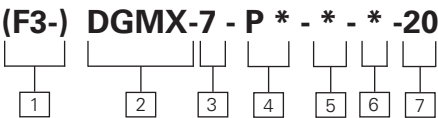
DGMX-7

General Description

These two-stage adjustable pressure reducing modules are used to regulate the downstream pressure in the line in which the integral reducing valve is installed, whilst the upstream pressure fluctuates above the reduced pressure.

The valve elements are formed as cartridges for ease of construction and servicing.

Model Code



1 Special seals for phosphate ester fluids
Omit for standard seals; see “Hydraulic fluids” in “Further Information” section.

2 Stak Module Reducer

3 Size
ISO 4401-7

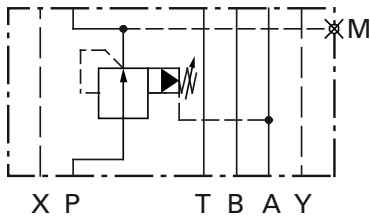
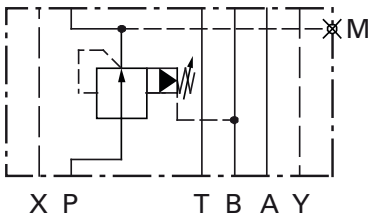
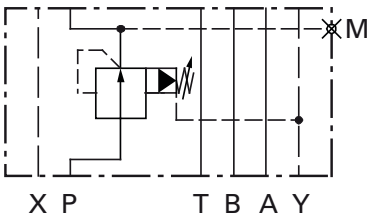
4 Function Ports
PP – pressure reducing function in the P line, piloted from P
PA – pressure reducing function in the P line, piloted from A
PB – pressure reducing function in the P line, piloted from B

5 Pressure adjustment range
B – 10 to 100 bar (145 to 1454 psi)
C – 10 to 160 bar (145 to 2326 psi)
F – 10 to 250 bar (145 to 3635 psi)
G – 350 bar (5000 psi)

6 Adjustment method
W – screw and lock nut
H – hand wheel with locknut

7 Design number,
Subject to change. Installation dimensions unchanged for numbers 20-29 inclusive.

Functional Symbol



Operating Data

Basic Characteristics	
Maximum flow	250 l/min (66 USgpm)
Maximum operating pressure	350 bar (5076 psi)
Operating temperature	-25 to +80°C (-13 to +176°F)
Pilot drain flow	0,5 L/min (0.13 USgpm)
Weights	8,65 kg (19.06 lb)

Performance Data

Performance Characteristics

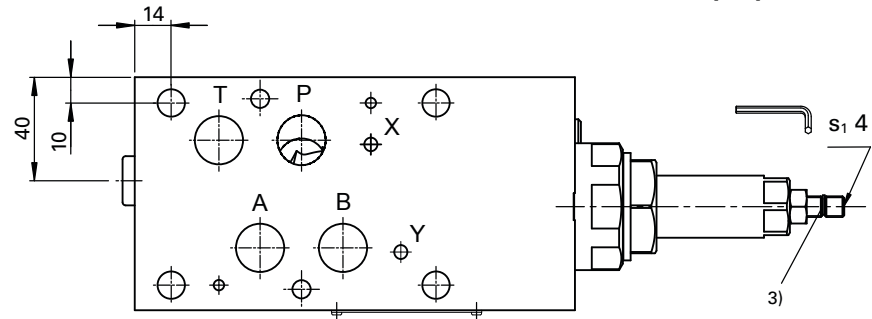
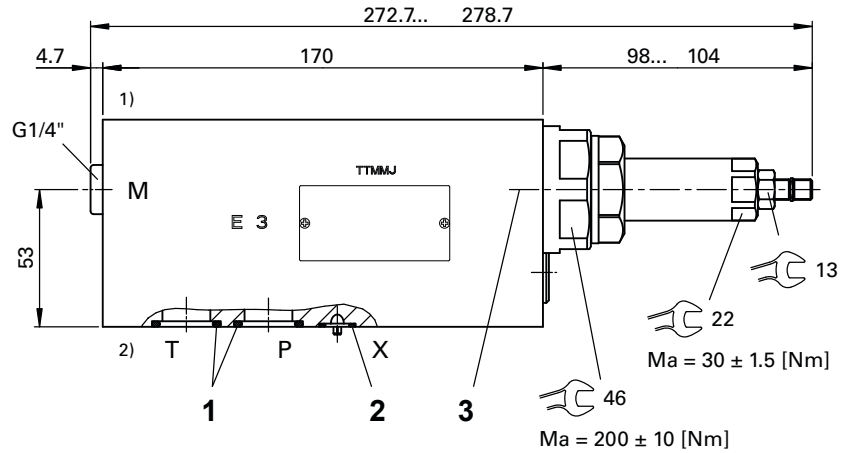
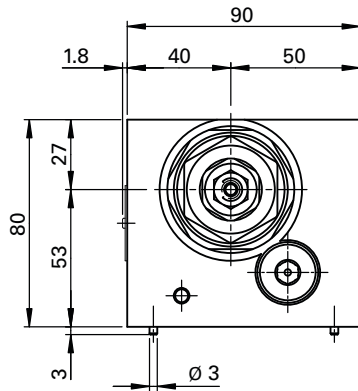
Typical performance with petroleum oil at 36 cSt (169 SUS) and 50°C (122°F).

Reduced Pressure Underride

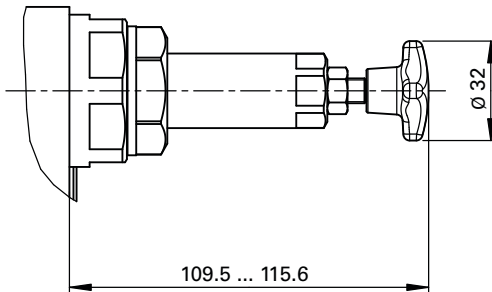
At cartridge outlet for various pressure settings.

Installation Dimensions in mm (inches)

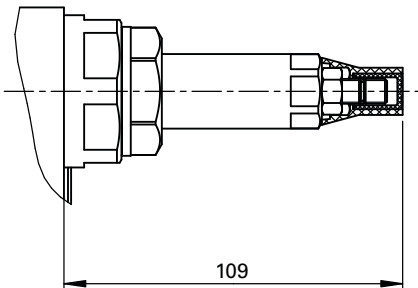
DGMX-7



H Option- Hand Wheel



W Option- Screw and Locknut



For all models, to increase pressure setting, unlock and turn the adjuster clockwise, viewed at the adjuster end. Turn counter-clockwise to decrease pressure setting.

Type H adjustment settings can be secured by tightening the lock screw in the end of the thimble.

For dimensions of ISO 4401, size 07 mounting surface and Eaton subplates, see catalog 2425.

For details of Eaton fixing bolt kits, see catalog 2314.

Pressure Relief Valve Modules

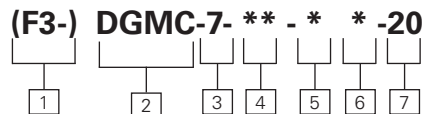
DGMC(2)-7

General Description

These two-stage adjustable pressure relief modules are used to limit the maximum pressure in the lines from which the integral relief elements are fed.

The relief elements are formed as cartridges for ease of construction and servicing.

Model Code



1 Special seals for phosphate ester fluids

Omit for standard seals; see "Hydraulic fluids" in "Further Information" section of catalog.

2 Stak Module Relief

3 Size

ISO 4401-07

4 Function

AT – Limits pressure in A, discharges to T

BT – Limits pressure in B, discharges to T

PT – Limits pressure in P, discharges to T

5 Pressure adjustment range

B – 10 to 100 bar (145 to 1454 psi)

C – 10 to 160 bar (145 to 2326 psi)

F – 10 to 250 bar (145 to 3635 psi)

G – 350 bar (5000 psi)

6 Adjustment method

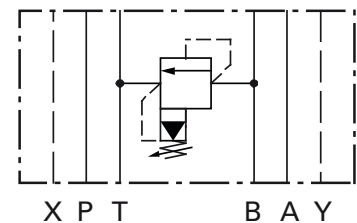
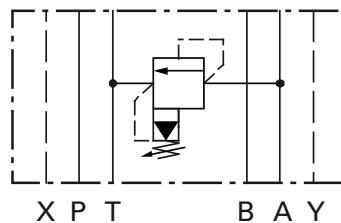
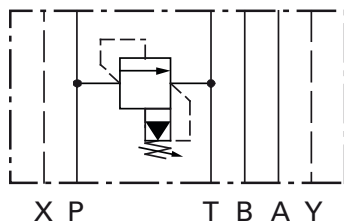
W – screw and lock nut

H – hand wheel with lock nut

7 Design number, 20 series

Subject to change. Installation dimensions unchanged for design numbers 20-29 inclusive.

Functional Symbol



Operating Data

Basic Characteristics

Maximum flow	300 l/min (80 USgpm)
Maximum operating pressure	350 bar (5076 psi)
Note that back pressure in line T, into which the valve's pilot drain is internally connected, increases the effective pressure setting. For pressure adjustment ranges see "Model Code".	
Operating temperature	-25 to +80°C (-13 to +176°F)
Pilot drain flow	0,5 L/min (0.13 USgpm)
Weights	8,55 kg (18.84 lb)

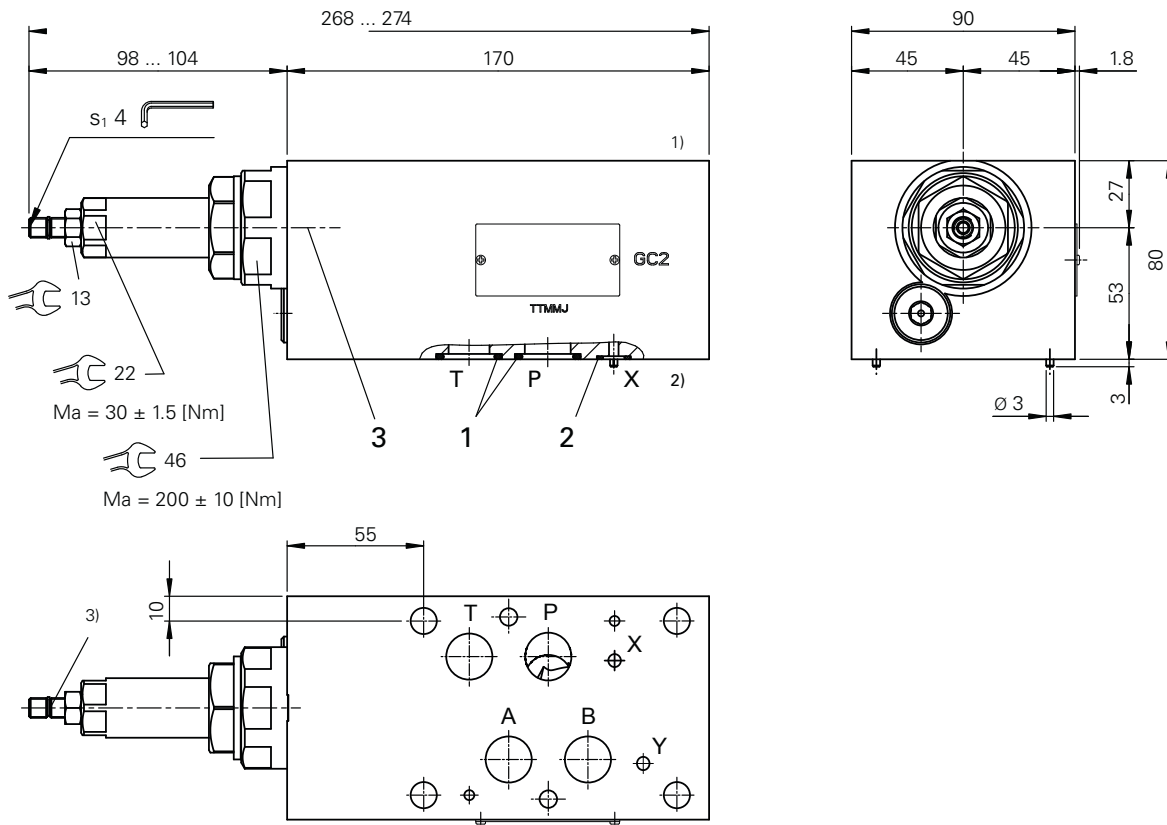
Performance Characteristics

Typical performance with petroleum oil at 36 cSt (169 SUS) and 50°C (122°F).

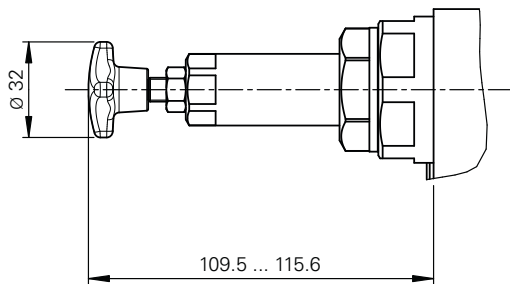
Pressure Override at Cartridge Inlet

At various pressure settings and cartridge outlet at 0 bar/psi.

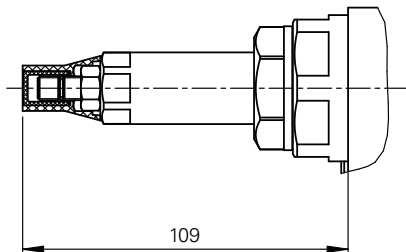
Performance Data



H Option - Hand Wheel



W Option - Screw and Locknut



For all models, to increase pressure setting, unlock and turn the adjuster clockwise, viewed at the adjuster end. Turn counter-clockwise to decrease pressure setting.

Type H adjustment settings can be secured by tightening the lock screw in the end of the thimble.

For dimensions of ISO 4401, size 07 mounting surface and Eaton subplates, see catalog 2425.

For details of Eaton fixing bolt kits, see catalog 2314.

SystemStak™ Pilot Operated Check Valve

DGMPC-7

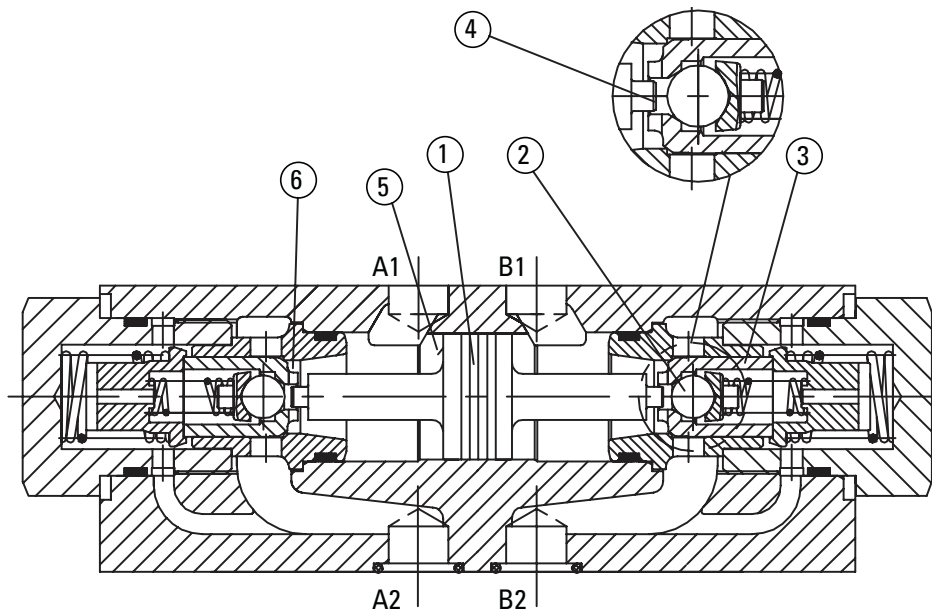
General Description

Features:

- Industry Standard Mounting, ISO 4001-7, NFPA T 3.51 M R1 and ANSI B 93.7 D07
- For use in vertical stacking assemblies
- For the leak free closure of one or both service ports

General

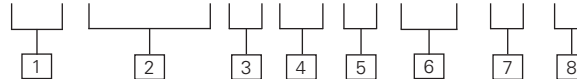
The DGMPC hydraulic operated check valve is of a sandwich plate design. They are used for leak-free closure of one or both service ports, even for long periods of time. Free flow occurs from A1 to A2 or B1 to B2. Flow in the opposite direction is blocked. The fluid flows from A1 to A2, the piston (1) is pressurised and is pushed to the right, thereby opening the ball poppet (2) which then opens the main poppet (3). In order to ensure correct closing of the valve, the service ports of the directional valve must be connected to tank in the neutral position (see typical circuit).



- 1 Piston
- 2 Ball Poppet
- 3 Main Poppet
- 4 Area A1
- 5 Area A2
- 6 Area A3

Model Code

(F3) - DGMPC - 7 - AB - *- (BA) - (*) - 30



1 Seal Options

F3 – Fluorocarbon seals, for Phosphate Ester (class L-HFD)

Blank – Nitrile, for Mineral oil Anti-wear hydraulic oil (class L-HM), Invert emulsion (class L-HFB) Water glycol (class L-HFC)

2 Stack module, piloted operated check valve

3 Size

ISO 4401-07

4 Check Valve Line

AB – A piloted from B
BA – B piloted from A (Single line only)

5 Cracking Pressure

K – 3 Bar
L – 5 Bar
M – 7.5 Bar
N – 10 Bar

6 Check Valve Line

BA – B piloted from A (Dual line only)

7 Cracking Pressure (Dual line only)

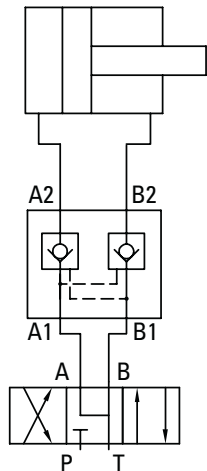
K – 3 Bar
B – 5 Bar
M – 7.5 Bar
N – 10 Bar

8 Design Number

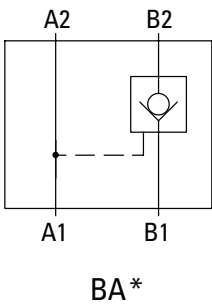
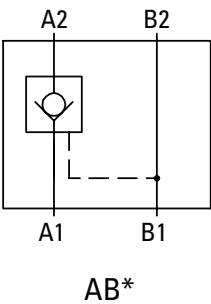
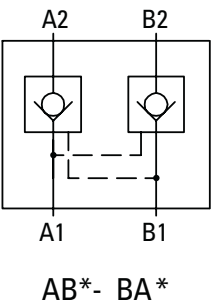
30

Functional Symbols

Typical Circuit



Symbols



Operating Data

Technical Data	
Maximum Flow (L/min)	300
Maximum Operating Pressure (bar)	315
Cracking Pressure	See "Characteristic Curves" graph
Area Ratio	A1/A2 = 1/11.8; A3/A2 = 1/2.8
Fluid	Mineral oils or phosphate ester
Fluid Temperature Range (OC)	-20 to 80
Fluid Viscosity Range (mm2/S)	2.8 to 500
Fluid Cleanliness Level (ISO)	19/17/14
Weight (Kg)	6.5

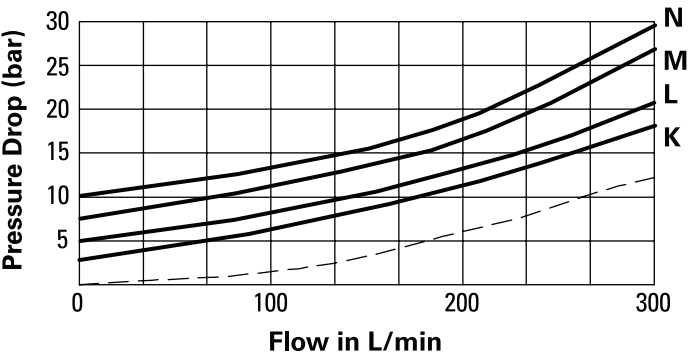
Performance Data

Characteristic Curves
(measured at
 $v = 41 \text{ mm}^2/\text{s}$ and $t = 50^\circ\text{C}$)

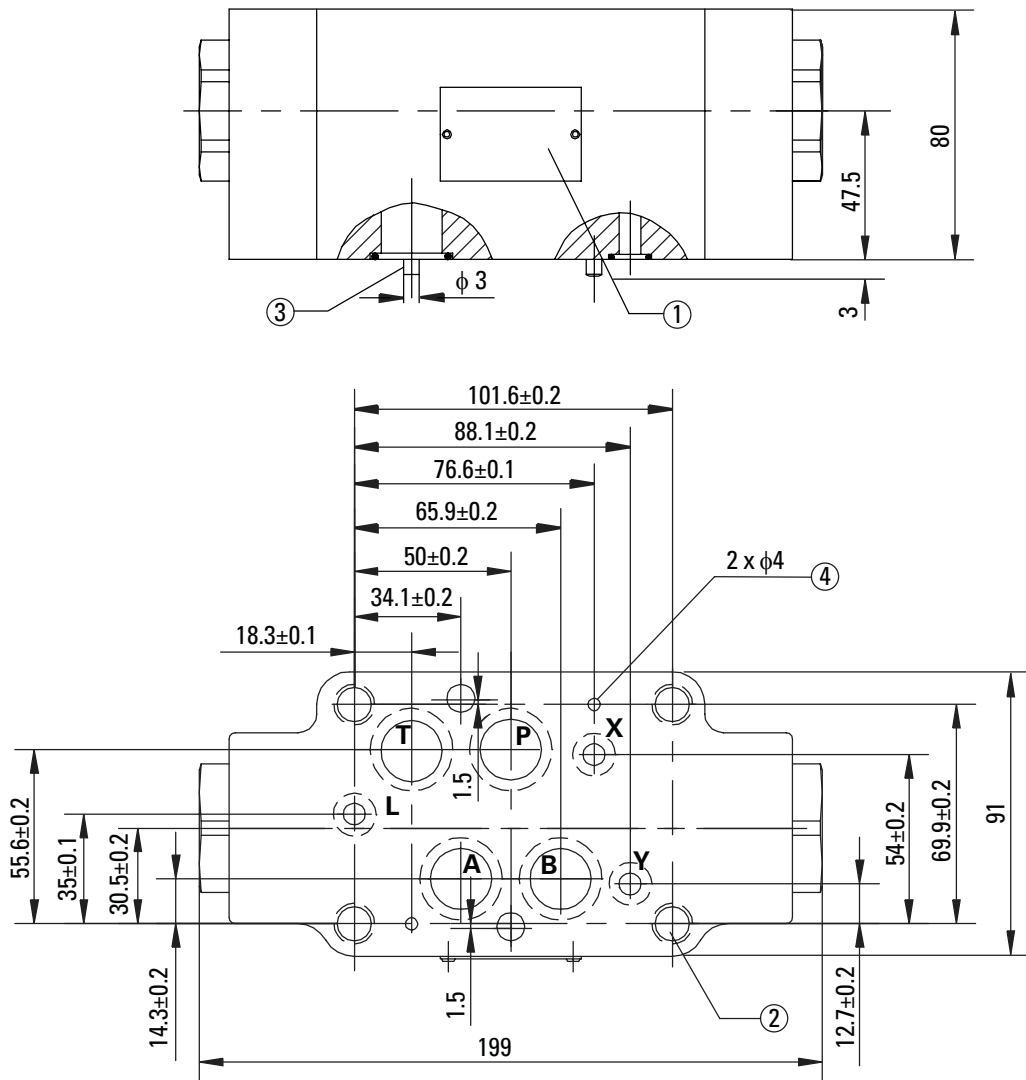
Solid Line
A1 - A2; B1 - B2

Dotted Line
A2 - A1; B2 - B1

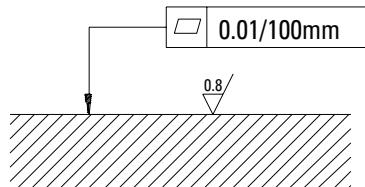
Cracking Pressure:
K = 3 bar
L = 5 bar
M = 7.5 bar
N = 10 bar



Installation Dimensions (in mm)



Required surface finish of mating face



- 1 Name plate
- 2 Valve mounting holes
- 3 Locating pins
- 4 Locating pin holes

Mounting bolts: 3/8-18 (4) & 1/4-20 (2), SAE, Grade 8; M10 (4) & M6 (2), DIN912-10.9; ISO 898, Class 12.9
 O-rings: 22mm x 2.5mm for ports A,B,P and T.
 O-rings: 10mm x 2mm for ports X,Y, and L.

SystemStak™ Throttle Valve with Check

DGMFN-7

General Description

Features:

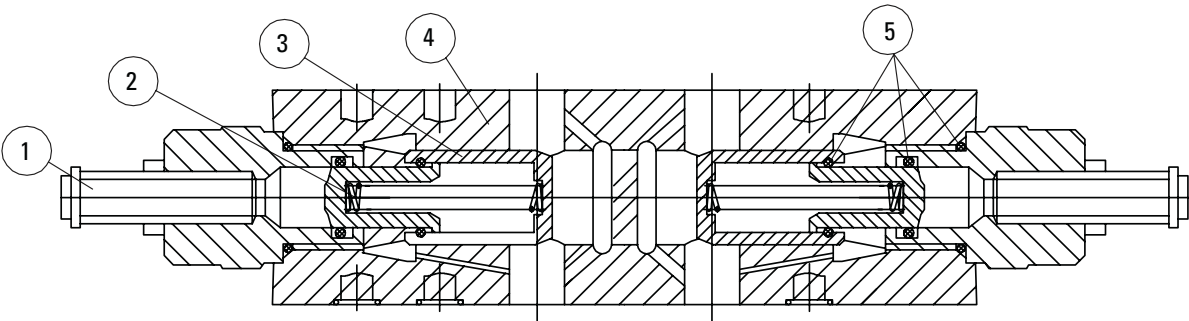
- Industry standard mounting, ISO 4401-7, NFPNA-T-3 .5.1-M-R-I, ANSI B 93.7 D07
- Sandwich plate design
- Limiting of main flow of two actuator ports
- Meter-in or meter-out control

General

DGMFN valves have double throttle/check valves in a sandwich plate design. They are used to limit main flow at one or two actuator ports. Two symmetrically arranged throttle/check valves limit flow (by means of adjustable throttle spools) in one direction and permit free return flow in the other direction.

Main flow limiting

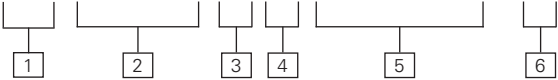
The double throttle/check valve is fitted between the directional valve and the subplate to change the speed of an actuator (main flow limiting)



- 1 Throttle Adjustment Screw
- 2 Spring
- 3 Spool
- 4 Valve Body
- 5 O-Ring

Model Code

F3 - DGMFN - 7 - * - A2W - B2W - 30



1 Seal Options

F3 – Fluorocarbon seals, for Phosphate Ester (class L-HFD)

Blank – Nitrile, for Mineral oil Anti-wear hydraulic oil (class L-HM), Invert emulsion (class L-HFB) Water glycol (class L-HFC)

2 Stack module, throttle valve with check

3 Size
ISO 4401-07

4 Direction of flow control

Y – Meter out
X – Meter in
YX – Meter out A, meter in B
XY – Meter in A, meter out B

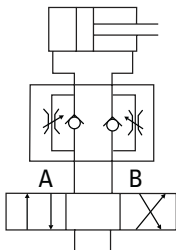
5 Control line (Wrench adjustment)

Both port A and B

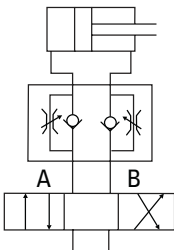
6 Design Number

30

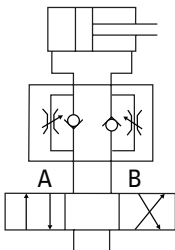
Functional Symbols



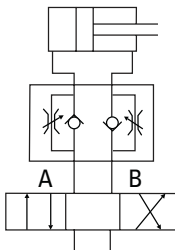
Meter-in control...X



Meter-out control...Y



A Meter -out control
B Meter -in control: YX



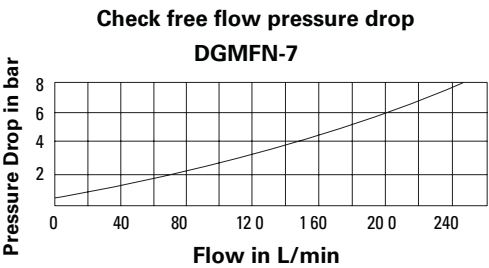
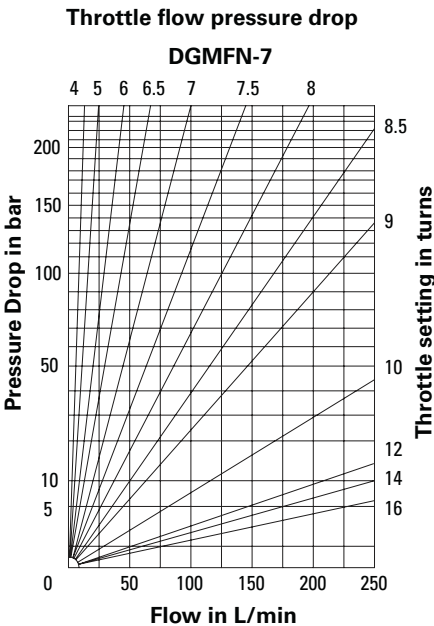
A Meter -in control
B Meter -out control: XY

Operating Data

Technical Data	
Maximum Flow (L/min)	250
Maximum Working Pressure (bar)	315
Fluid	Mineral oils or phosphate ester
Fluid Temperature Range (0 C)	-20 to + 80
Fluid Viscosity Range (mm2/S)	2.8 to 500
Fluid Cleanliness Level (ISO)	19/17/14
Weight (Kg)	4.7

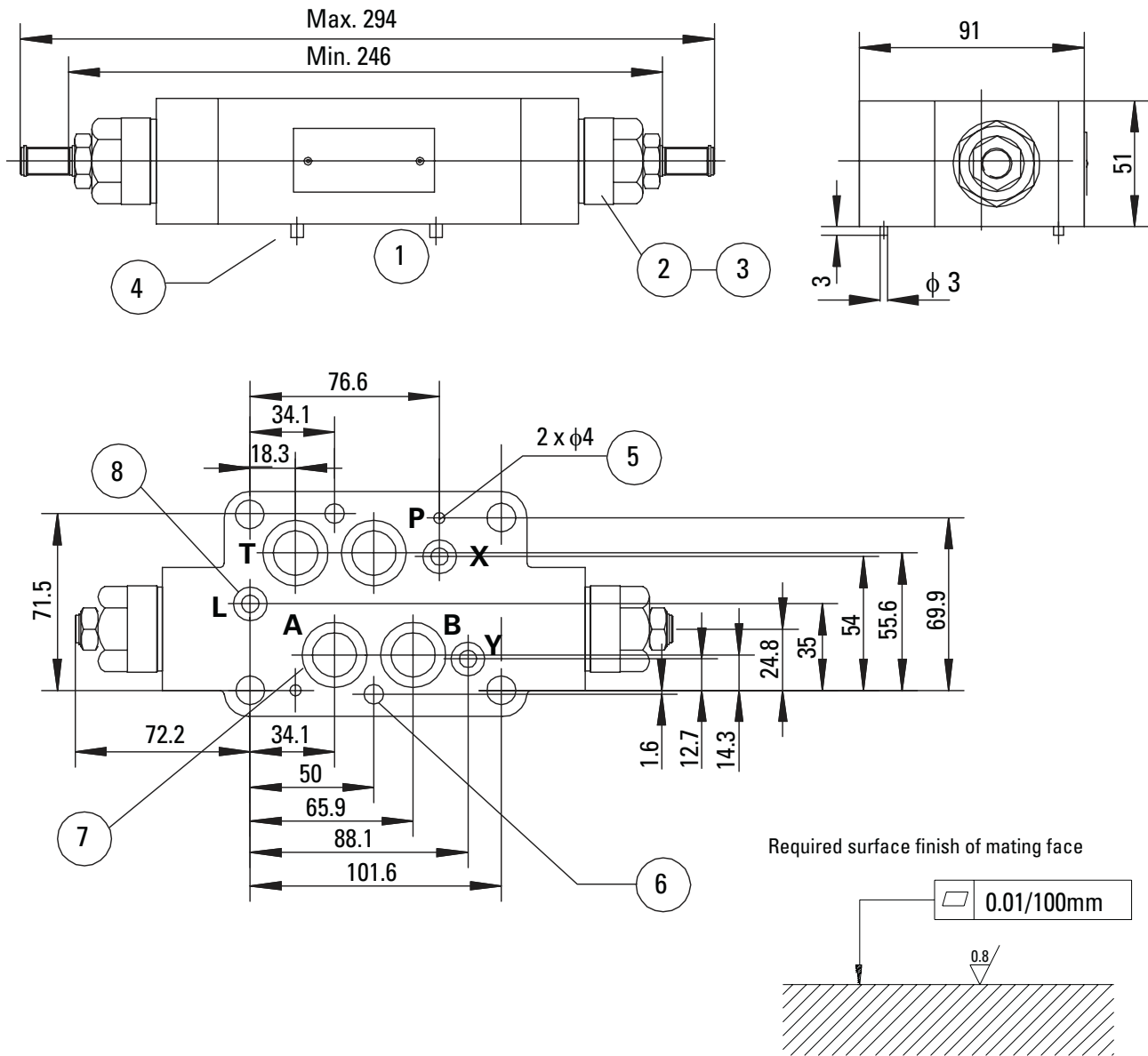
Performance Data

Characteristic Curves
(measured at
v = 41 mm2/s and
t = 50°C)



Installation Dimensions

(Dimensions in mm)



- 1 Name plate
- 2 Screw for flow adjustment
- 3 Turn anti-clockwise = increases flow, turn clockwise = decreases flow
- 4 Two locating pins
- 5 Two locating pin holes
- 6 Valve mounting holes
- 7 O-ring ports A,B,P,T
- 8 O-ring ports X,Y,L

Mounting bolts: ½-UNC, SAE, Grade 8; M10 (4) & M 6 (2) , DIN912-10.9; ISO 898, Class 12.9

O-Ring: size 22mm x 2.5mm for port A,B,P and T

O-Ring: size 10mm x 2mm for port X,Y, and L

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Document No.: E-VLVI-SS001-E1
October 2015



SystemStak™ Pilot Operated Check Valve

Series DGMPC-H8

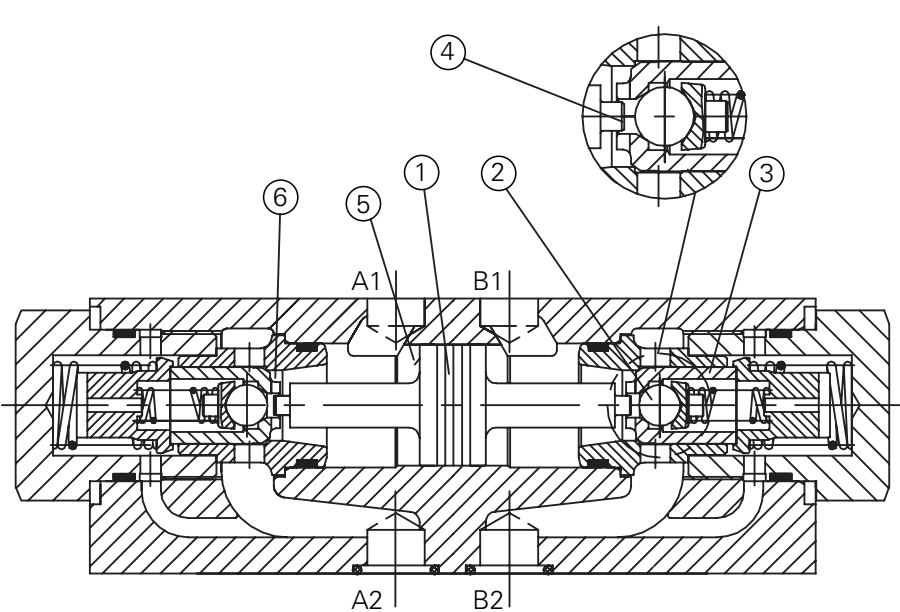
General Description

Features:

- Industry Standard Mounting, ISO 4001-8, NFPA T 3.51 M R1 and ANSI B 93.7 D08
- For use in vertical stacking assemblies
- For the leak free closure of one or both service ports

General

The DGMPC hydraulic operated check valve is of a sandwich plate design. They are used for leak-free closure of one or both service ports, even for long periods of time. Free flow occurs from A1 to A2 or B1 to B2. Flow in the opposite direction is blocked. The fluid flows from A1 to A2, the piston (1) is pressurized and is pushed to the right, thereby opening the ball poppet (2) which then opens the main poppet (3). In order to ensure correct closing of the valve, the service ports of the directional valve must be connected to tank in the neutral position (see typical circuit).



- 1 Piston
- 2 Ball Poppet
- 3 Main Poppet
- 4 Area A1
- 5 Area A2
- 6 Area A3

Model Code

(F3)	DGMPC	H8	AB	*	(BA)	(*)	10
☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8

1 Seal Options

F3 – Fluorocarbon seals, for Phosphate Ester (class L - HFD)
Blank – Nitrile, for Mineral oil Anti-wear hydraulic oil (class L - HM), Invert emulsion (class L - HFB) Water glycol (class L - HFC)

2 Stack module, piloted operated check valve

3 Size
H8- ISO 4001-8

4 Check Valve Line
AB – A piloted from B
BA – B piloted from A (Single line only)

5 Cracking Pressure
K – 3 Bar
L – 5 Bar
M – 7.5 Bar
N – 10 Bar

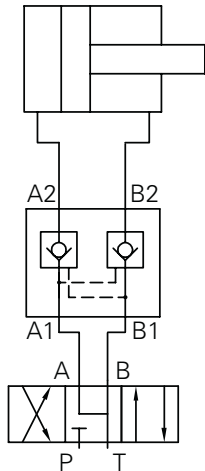
6 Check Valve Line
BA – B piloted from A (Dual line only)

7 Cracking Pressure (Dual line only)
K – 3 Bar
L – 5 Bar
M – 7.5 Bar
N – 10 Bar

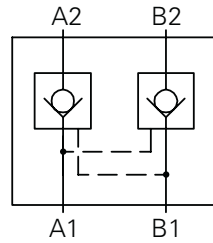
8 Design Number
10

Functional Symbols

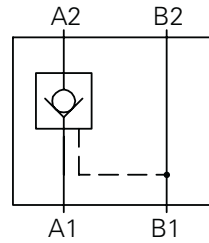
Typical Circuit



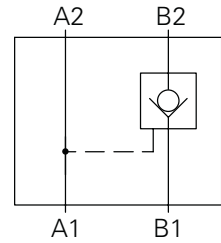
Symbols



AB* - BA*



AB*



BA*

Operating Data

Technical Data

Maximum Flow (L/min)	450
Maximum Operating Pressure (bar)	315
Cracking Pressure	See "Characteristic Curves" graph page 3
Area Ratio	A1/A2 = 1/13.6; A3/A2 = 1/2.8
Fluid	Mineral oils or phosphate ester
Fluid Temperature Range (°C)	-20 to 80
Fluid Viscosity Range (mm²/s)	2.8 to 500
Fluid Cleanliness Level (ISO)	19/17/14
Weight (Kg)	12

Performance Data

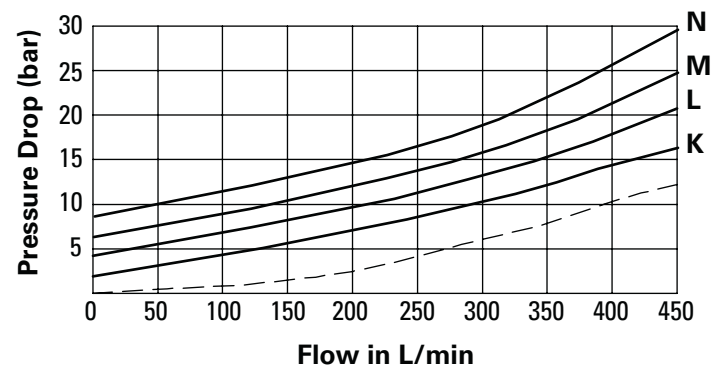
Characteristic Curves
(measured at $v = 41 \text{ mm}^2/\text{s}$
and $t = 50^\circ\text{C}$)

Solid Line

A1 - A2; B1 - B2

Dotted Line

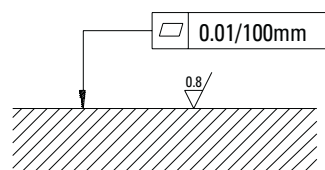
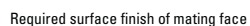
A2 - A1; B2 - B1



Cracking Pressure:

K – 3 bar
L – 5 bar
M – 7.5 bar
N – 10 bar

(Dimensions in mm)



- 1** Cracking pressure 3 bar or 5 bar, check valve on both ports A and B
- 2** Cracking pressure 7.5 bar or 10 bar, check valve on both ports A and B
- 2.1** Cracking pressure 7.5 bar or 10 bar, check valve on port A
- 2.2** Cracking pressure 7.5 bar or 10 bar, check valve on port B
- 3** Name plate
- 4** Valve mounting holes, 6 x 15mm
- 5** Locating pins
- 6** Locating pin hole

Torque 150 lb-ft (250 Nm)

O-rings: 19mm x 3mm for ports X,Y, and L.

SystemStak™ Throttle Valve with Check

Series DGMFN-H8

General Description

Features:

- Industry standard mounting, ISO 4401-8, NFPNA-T-3 .5.1-M-R-I, ANSI B 93.7 D08
- Sandwich plate design
- Limiting of main flow of two actuator ports
- Meter-in or meter-out control

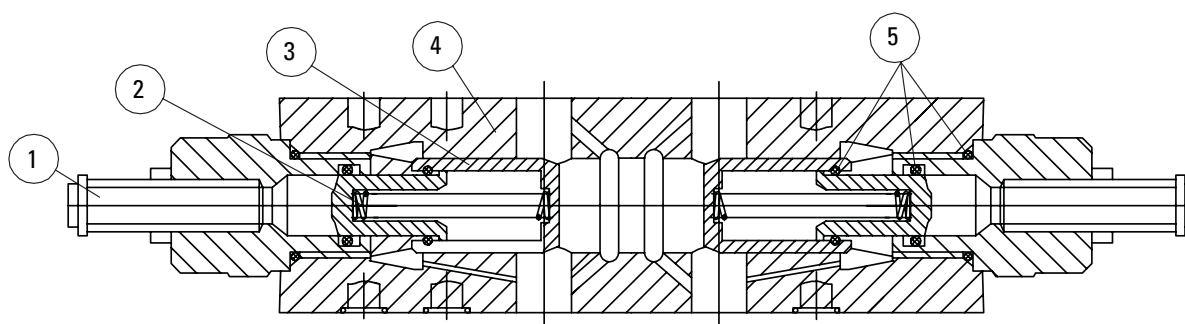
General

DGMFN valves have double throttle/check valves in a sandwich plate design. They are used to limit main flow

at one or two actuator ports. Two symmetrically arranged throttle/check valves limit flow (by means of adjustable throttle spools) in one direction and permit free return flow in the other direction.

Main flow limiting

The double throttle/check valve is fitted between the directional valve and the subplate to change the speed of an actuator (main flow limiting)



- 1 Throttle Adjustment Screw
- 2 Spring
- 3 Spool
- 4 Valve Body
- 5 O-Ring

Model Code

F3 **DGMFN** **H8** ***** **A2W-B2W** **10**

1 2 3 4 5 6

1 Seal Options

F3 – Fluorocarbon seals, for Phosphate Ester (class L - HFD)

Blank – Nitrile, for Mineral oil
Anti-wear hydraulic oil (class L - HM),
Invert emulsion (class L - HFB) Water glycol (class L - HFC)

2 Stack module, throttle valve with check

3 Size

H8 – ISO 4001-8

4 Direction of flow control

Y – Meter out

X – Meter in

YX – Meter out A, meter in B

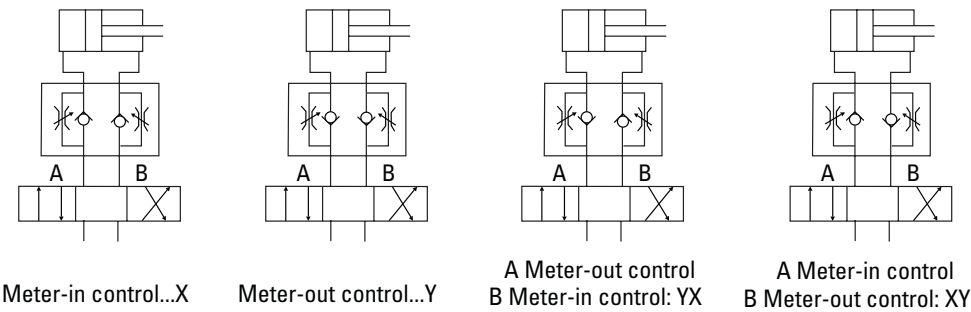
XY – Meter in A, meter out B

5 Control line (Wrench adjustment)

Both port A and B.

6 Design number

Functional Symbols

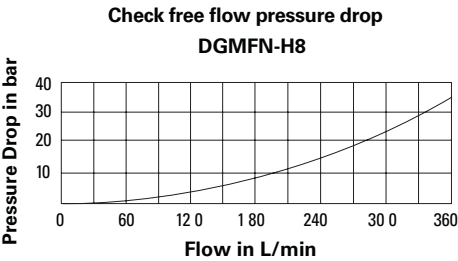
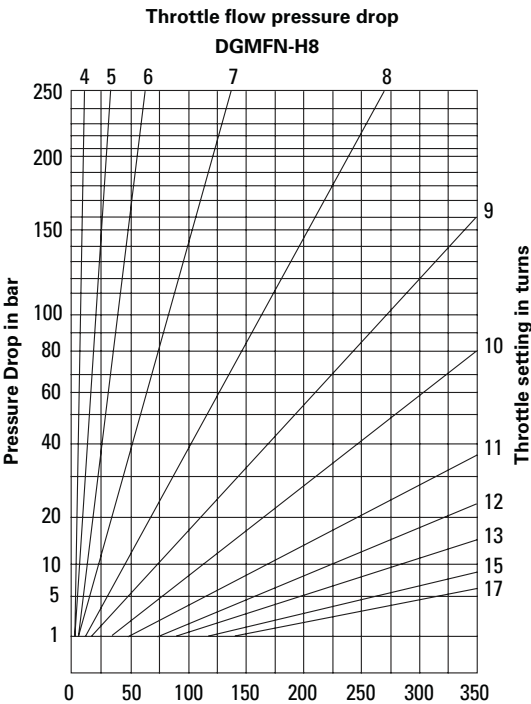


Operating Data

Technical Data	
Maximum Flow (L/min)	350
Maximum Working Pressure (bar)	315
Fluid	Mineral oils or phosphate ester
Fluid Temperature Range (0 C)	-20 to + 80
Fluid Viscosity Range (mm2/S)	2.8 to 500
Fluid Cleanliness Level (ISO)	19/17/14
Weight (Kg)	8

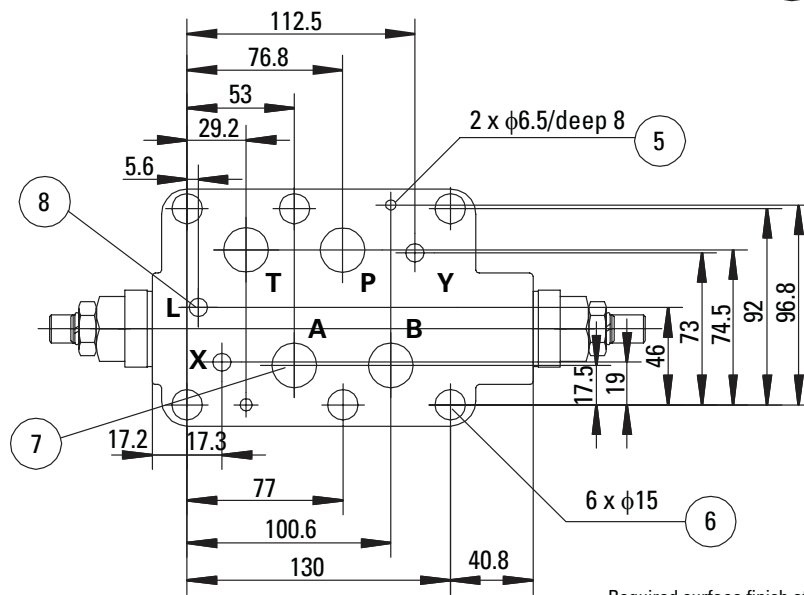
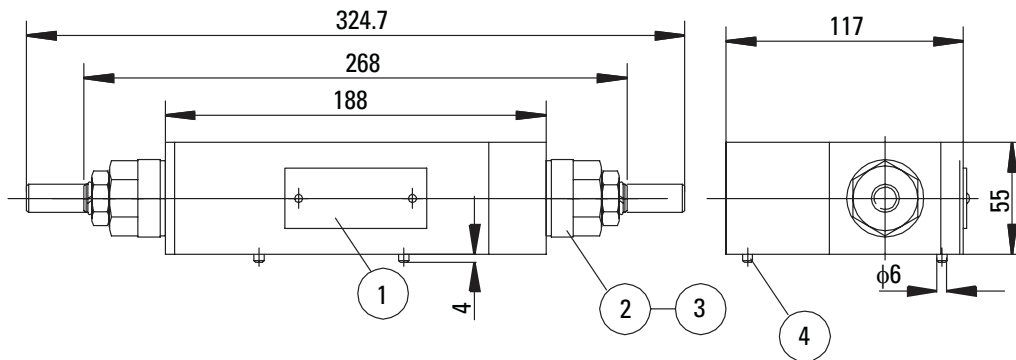
Performance Data

Characteristic Curves
(measured at
 $v = 41 \text{ mm}^2/\text{s}$ and
 $t = 50^\circ\text{C}$)

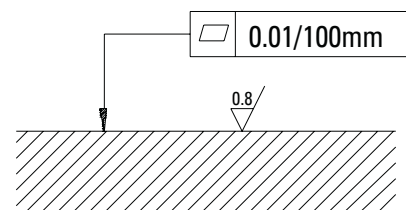


Installation Dimensions

(Dimensions in mm)



Required surface finish of mating face



- 1 Name plate
- 2 Screw for flow adjustment
- 3 Turn anti-clockwise = increases flow, turn clockwise = decreases flow
- 4 Two locating pins
- 5 Two locating pin holes
- 6 Valve mounting holes
- 7 O-ring ports A,B,P,T
- 8 O-ring ports X,Y,L

Mounting bolts: ½-UNC, SAE, Grade 8; M14, DIN912-10.9; ISO 898, Class 12.9

Torque 150 lb-ft (250 Nm)

O-Ring: 27mm x 3mm for port A,B,P and T

O-Ring: 19mm x 3mm for port X,Y, and L

Single Station Subplates & Mountings

DGSM-8

General Data

Before beginning to assemble individual modular valves, mating surfaces must be undamaged and completely clean in order to ensure a perfect seal.

Single Station Subplates

DGSM single station subplates are designed for individual mounting of one modular valve system.

Mounting Pad

When a subplate is not used, a machined pad (as indicated by subplate shaded area) must be provided for mounting. Pad must be flat within 0,013 mm (.0005 inch) and smooth within 1,6 µm (63 microinch).

Bolt Length Selection Chart - Bolt Kits for Modular Valves

Note: This table serves as a guide in selecting the proper mounting bolt length for various combinations of modules. After the circuit is developed and the components to be stacked are predetermined, add the required lengths plus a 20,6 mm (.81 inch) thread engagement for the subplate or manifold. Select the proper inch thread bolt and order by the bolt kit number. All bolt kits include six (6) socket head screws and six (6) lockwashers 4,4 mm (.17 inch) thick.

Mounting Bolts for Modular Valves

Mounting the various combinations of modular valves in vertical assemblies will require bolt kits of different lengths. These lengths can be determined from the Bolt Length/Kits Selection Chart (below) which indicates the height of the various modules. Mounting bolts provided by the customer should be SAE grade 7 or better.

Bolt Kits for Modular Mounting

A range of bolt kits is available for mounting the various modules, normally topped with a DG5S-8, DG3S-8 or DG17S-8 directional control valve. As the modules are of varying height, it is necessary to calculate the height of the stack and then add 20,66mm (.81 in.) for thread engagement. The Bolt Length/Kits Selection Chart (below) contains a list of all possible bolt lengths for the modular system to NFPA-D08 (ISO-4401-08) interface.

Using two (2) center bolts is optional. All six (6) bolts are recommended for pressure ranges of 140 bar (2000 psi) to 210 bar (3000 psi) for maximum seal life.

DG5S-8	FN, R, X	C	PC	Subplate	Bolt Length	Kit Model No.
Length Required (inch)*						
1.86*	3.5	2.75	4.0	0.64*	½ - 13 UNC thd.	
1	–	1	–	1	5-¼	BK255693
1	1	–	–	1	6	BK255691
1	–	–	1	1	6-½	BK255692
1	1	1	–	1	8-¾	BK255668
1	–	1	1	1	9-¼	BK255671
1	2	–	–	1	9-½	BK255670
1	1	–	1	1	10	BK255669
1	2	1	–	1	12-¼	BK255676
1	1	1	1	1	12-¾	BK255677
1	3	–	–	1	13	BK255678
1	2	–	1	1	13-½	BK255679

Recommended bolt torque 79 Nm (700 lb. in.).

* Assumes use of 4,4 mm (.17 inch) thick lockwasher.

Ordering Procedure

Valves, subplates and mounting bolts must be ordered separately.

Example:

One (1) DG5S-8-0C-M-W-B-2* Valve
One (1) DGX-H06-2-60 Reducing module
One (1) DGSM-8-10-T12 Subplate
One (1) BK255691 Inch bolt kit

Example for ordering:

(1) DG5S-8 Valve 42,9 mm (1.69 in.)
(1) DGFN-06 Module 88,9 mm (3.50 in.)
(1) DGPC-06 Module 101,6 mm (4.00 in.)
+ Manifold thread engagement 20,6 mm (.81 in.)
Total bolt length 254,0 mm (10.00 in.)
Order bolt kit number BK225669.

Mounting Subplates

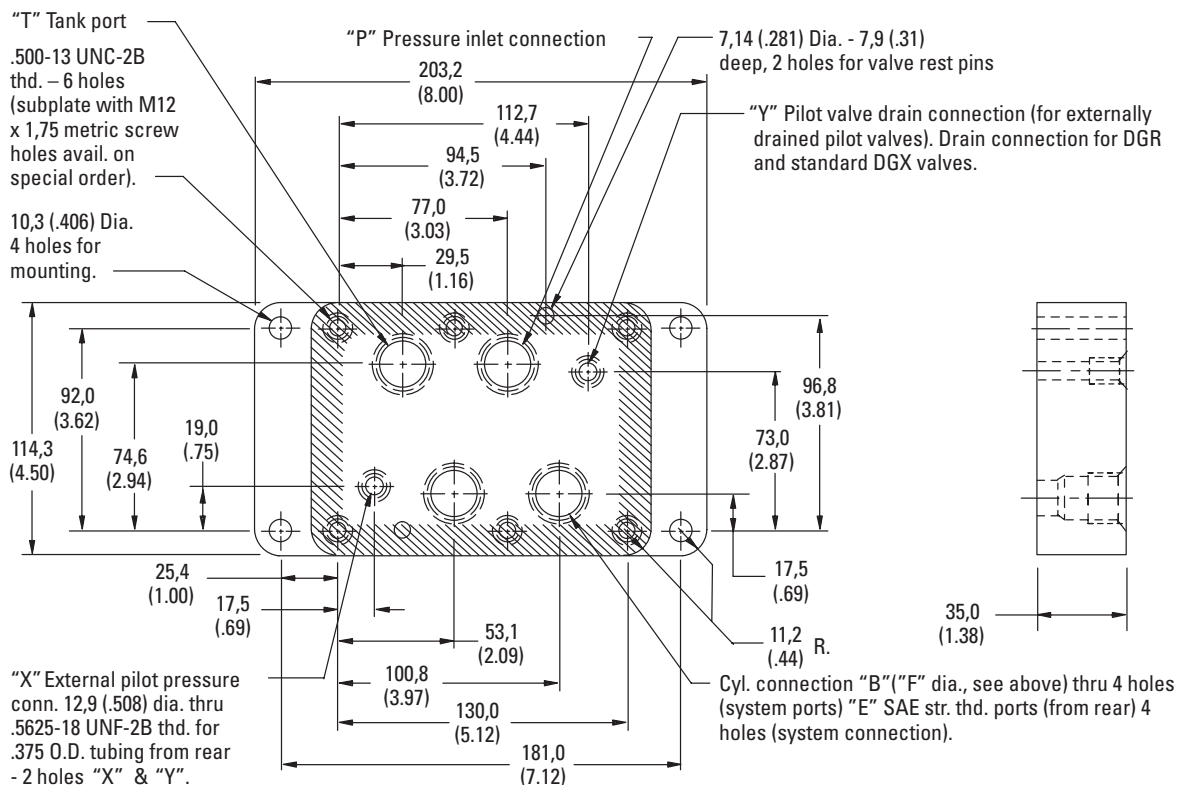
Model No.	"E" Thd.	Tubing O.D.	"F" Dia.	Weight (approx.)
DGSM-8-10-T12	1.0625-12 UN	.750	23,8 (.937)	5.0 kg (11 lbs)
DGSM-8-10-T16	1.3125-12 UN	1.000	24,6 (.969)	5.0 kg (11 lbs)

Additional Subplates

Model No.	Tubing O.D. (thd. size)	System Connections
DGSME-8-10-T12	.750 O.D. (1.0625-12 UN thd.)	Side
DGSME-8-10-T16	1.000 O.D. (1.3125-12 UN thd.)	Side
DGSM-8-10-T20	1.250 O.D. (1.6250-12 UN thd.)	Rear

Mounting Subplate DGSM-8-10-T12/16

Dimensions in millimeters (inch)



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Printed in USA
Document No.: E-VLVI-SS001-E1
October 2015